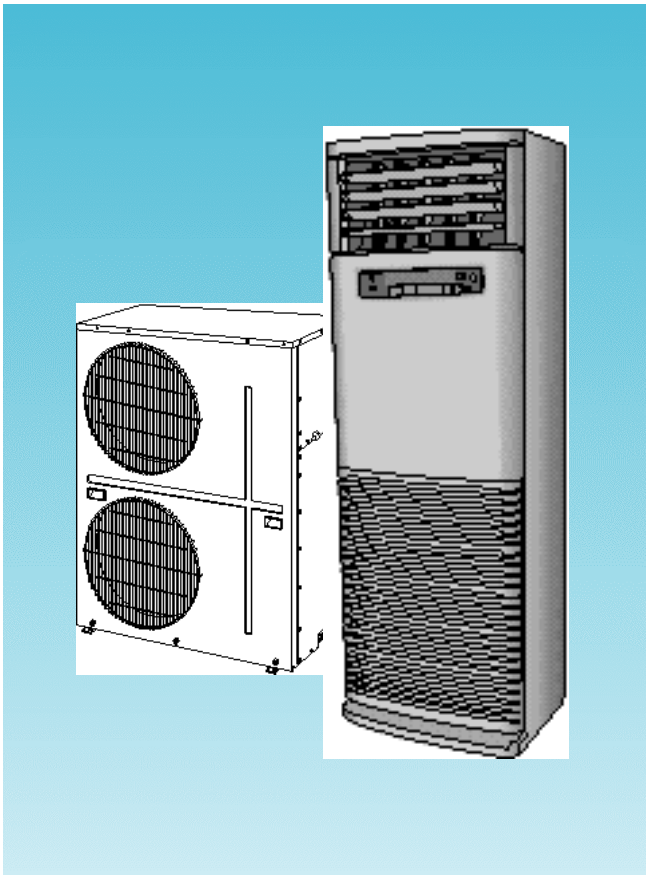
SAMSUNG

PACKAGED AIR CONDITIONER

APH450PG

SERVICE Manual

AIR CONDITIONER



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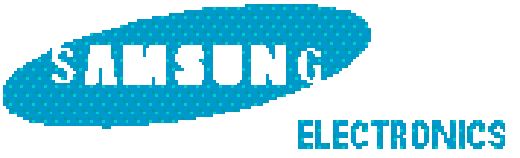

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Printed in Korea.
Code No. DB81-10147A(1)

1. Precautions

1) Turn off the the power.
Be sure to turn off the power before attempting to repair the unit such as the disassembly of the unit.

2) Be careful of electric shock
When checking the circuit with the power connected in unavoidable circumstances, take special care not to touch the live parts. There is a danger of electric shock.

3) Use of appropriate parts
Be sure to use the genuine parts of the relevant model when it is necessary to replace parts. (Replace parts instead of repairing with regard to the malfunctioning of electric contact areas. Never attempt to modify the unit. It is extremely dangerous for the consumer to attempt to repair the unit on his(her) own.)

4) Use of proper tools
Use appropriate tools for repair, and use measuring equipment after accurate calibration. Using worn tools may result in problems, including poor contact and poor connection.

5) Avoid damage to electric wire or electric cord.
Check the electric cord or electric wire for any damage during repair.
Be sure to replace it if damaged.

6) Avoid intermediate connection of the electric cord.
Never attempt to make an intermediate connection by cutting the middle area of the electric cord or make a connection to the power receptacle as it is very dangerous, causing problems or fire.

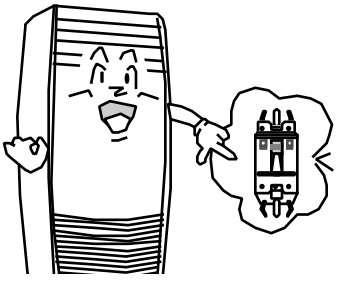
7) Checking of insulation
Be sure to check the insulation resistance after completion of the assembly work.
(Check whether the insulation resistance of the electric wire and grounding terminal is over 30MΩ by using the insulation resistance tester, and then connect the power source.)

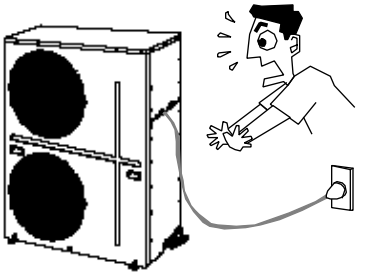
8) Checking of grounding
Check the grounding condition, and perform repair if poorly grounded.

9) Checking of installation condition
Check the installation condition of the unit, and perform repair if there is any defective area.
If the unit remains in an unstable installing condition, install it at a new site.

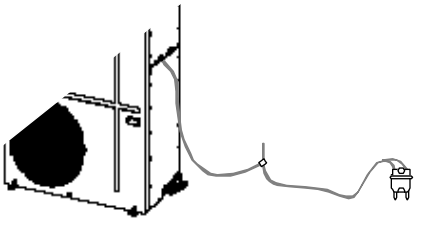
10) Be careful of children
As the repair of the unit involves a lot of dangerous elements, do not allow children to approach nearby during repair work.

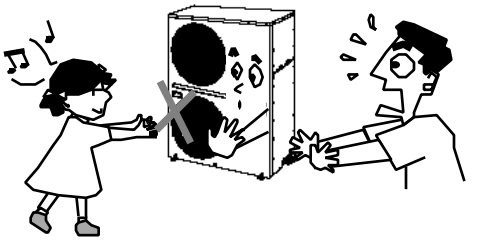
Turn off the sub power switch separately installed.





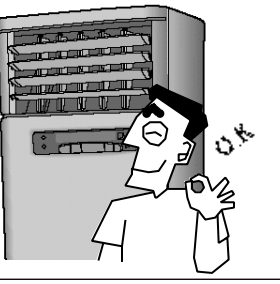
No connection with the power receptacle





Cleaning

Upon completion of the repair, clean the air conditioner and surrounding area, and inform the customer of completion of the repair.



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2. Product Specifications

2-1 Table

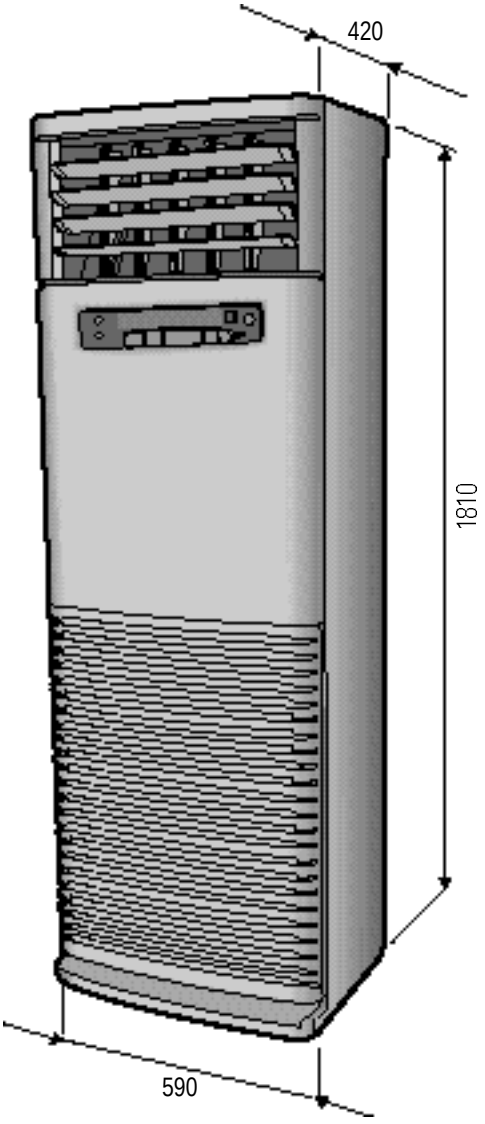
ITEM		Model	APH450PG	
			Indoor unit	Outdoor unit
Power source		ø/V/Hz	3 / 380 / 50	
Capacity		kcal/h	11,250 / 12,200	
(Cooling/Heating)		BTU/h	45,000 / 48,800	
Aux. heater		Watt/h	3,000	
Power consumption		W	5,000 / 4,700	
E.E.R (Cooling/Heating)		kcal/Wh	2.25 / 2.60	
Running current (C/H)		A	9 / 8.7	
Noise level (C/H)		dBA	53 / 54	63
Moisture removal		l/hr	5.8	
Air circulation		m^3/h	1,920	4,800
Dimension	Width	mm	590 / 704	930 / 1,200
(Net/Packed)	Height	mm	1,810 / 1,925	1,240 / 1,370
	Depth	mm	420 / 600	385 / 540
Weight(Net/Packed)			75 / 85	123 / 133
Piping box		kg	14	
Refrigerant type			R-22	
Refrigerant quantity		kg	4.8	
Compressor type			Reciprocating	
Protective device			Internal thermostat (CM)	
			High pressure switch	
Refrigerant piping size		inch	Gas : 3/4", Liquid : 3/8"	
Drain piping size		mm	I.D 18	I.D 16
Loading Q'ty (20'/40')		set	12 / 24	

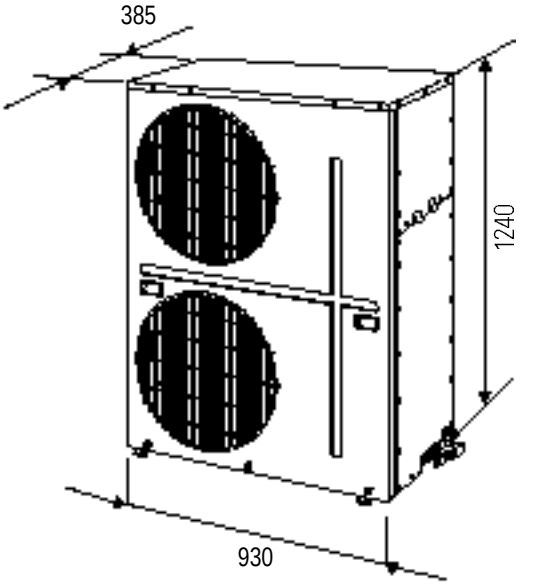
Note: (1) The data are measured at the following conditions.

		APH450PG	
		Cooling	Heating
Indoor air temperature	DB	27.0˚C(80.6˚F)	20.0˚C(68.0˚F)
	WB	19.0˚C(66.2˚F)	12.0˚C(53.6˚F)
Outdoor air temperature	DB	35.0˚C(95.0˚F)	7.0˚C(44.6˚F)
	WB	24.0˚C(75.2˚F)	6.0˚C(42.8˚F)

2-2 Dimensions

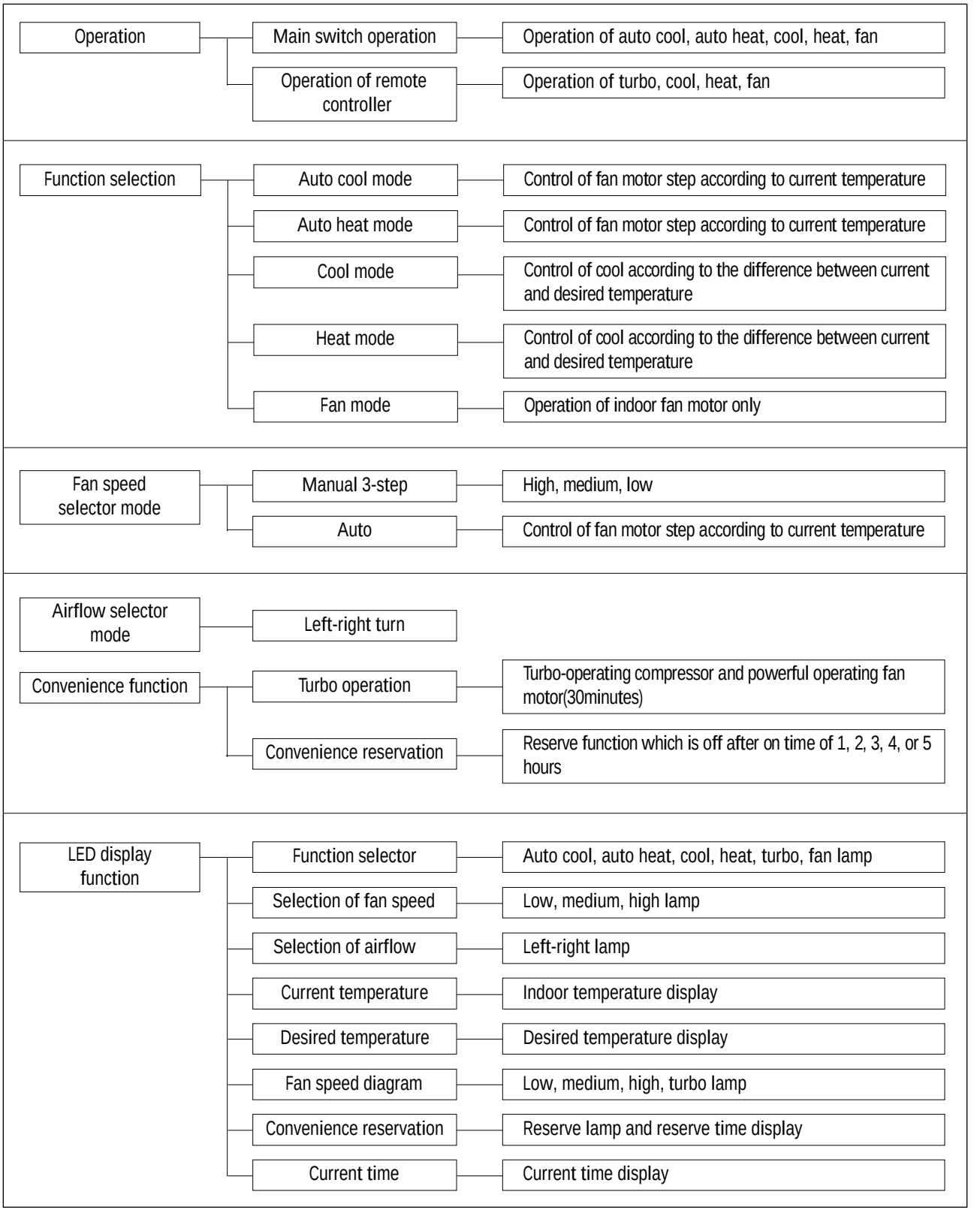
Unit : mm





3. Operating instructions and Installation

3-1 Operating Instructions

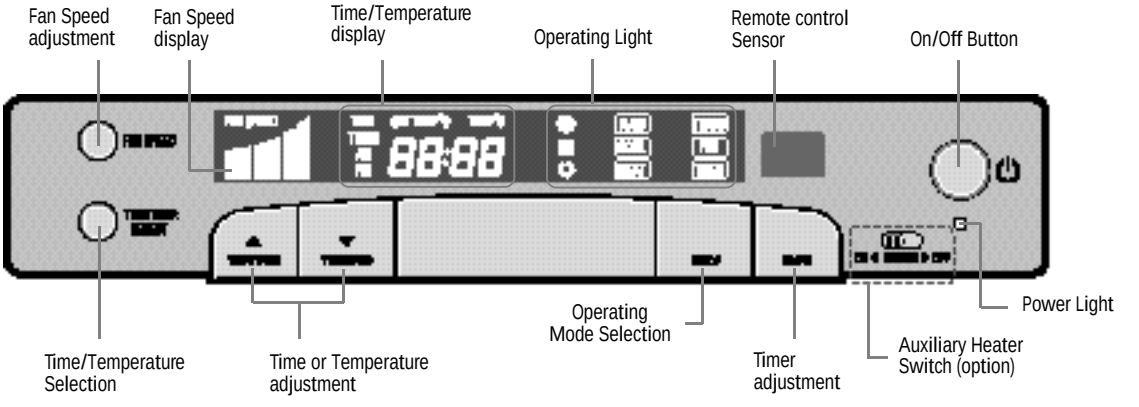

Operation
Main switch operation
Operation of auto cool, auto heat, cool, heat, fan
Operation of remote controller
Operation of turbo, cool, heat, fan
Function selection
Auto cool mode
Control of fan motor step according to current temperature
Auto heat mode
Control of fan motor step according to current temperature
Cool mode
Control of cool according to the difference between current and desired temperature
Heat mode
Control of cool according to the difference between current and desired temperature
Fan mode
Operation of indoor fan motor only
Fan speed selector mode
Manual 3-step
High, medium, low
Auto
Control of fan motor step according to current temperature
Airflow selector mode
Left-right turn
Convenience function
Turbo operation
Turbo-operating compressor and powerful operating fan motor(30minutes)
Convenience reservation
Reserve function which is off after on time of 1, 2, 3, 4, or 5 hours
LED display function
Function selector
Auto cool, auto heat, cool, heat, turbo, fan lamp
Selection of fan speed
Low, medium, high lamp
Selection of airflow
Left-right lamp
Current temperature
Indoor temperature display
Desired temperature
Desired temperature display
Fan speed diagram
Low, medium, high, turbo lamp
Convenience reservation
Reserve lamp and reserve time display
Current time
Current time display

3-2 Key type and functions

3-2-1 PANEL key type and functions

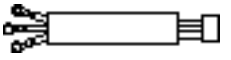
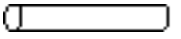
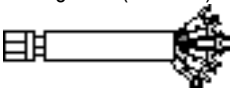
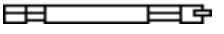
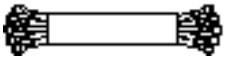
Key name	Key operating function	Key type
On/off	Start and end of operation - ON 1 time = operation start, ON again = operation end. - No continued operation	TACT
Mode selection	Change of the operation mode - Each time the button is pressed(ON), the mode is changed in the following order: "auto → cool → fan"(standard=auto) - No continued operation	TACT
Fan speed selection	Setting of the indoor fan motor speed - Each time the button is pressed ON, the mode is changed in the following order: "low → medium → high"(standard=high)	TACT
Temperature(time) setting(up)	Increase the desired temperature(current time) - Temperature: When pressing the button(ON) one time, the desired temperature is increased by the unit of 1°C.(18°C- 30°C) - Time: When pressing the button(ON) one time, the time is increased by 1 minte. If the "on" button is pressed continuously, the time is increased by 10 minutes. - One short, and continued operation	TACT
Temperature(time) setting(down)	Decrease the desired temperature (current time) - Temperature: When pressing the button(ON) one time, the desired temperature is decreased by the unit of 1°C. (18°C - 30°C) - Time: When pressing the button(ON) one time, the time is decreased by 1 minute. If the "on" button is pressed continuously, the time is decreased by 10 minutes. - One short, and continued operation	TACT
Change of display	The temperature and current time can be changed. - If the "on" key is pressed 1 time, current temperature and desired temperature are displayed. - If the "on" key is pressed 1 time, current time is displayed.	TACT
Brief reservation	The hours of 1,2,3,4 and 5 is selected whenever one time of on is performed.	TACT
Heater on/off selection	If the switch is selected to the on direction, the heater is operating at the heater operation condition. The heater is not operating when the switch is selected to the off position.	SLIDE

* Operating functions



3-3 Accessory Parts List

3-3-1 Connection Parts

No.	Part Name	Q'ty	Remarks
1	Connecting pipe 3/8" (ø9.52mm)	1	Option (Piping box)
2	Connecting pipe 3/4" (ø19.05mm)	1	
3	Heater cable (3 strand) 	1	
4	Protection tube 	1	
5	Connecting wire (7 strand) 	1	Piping box
6	Wire of sensor (2 strand) 	1	
7	Power cable 	1	
8	Drain hose	1	
9	Finishing tape	2	
10	Insulation tape	1	
11	Insulation tube for indoor unit piping connection	1	

3-3-2 Others

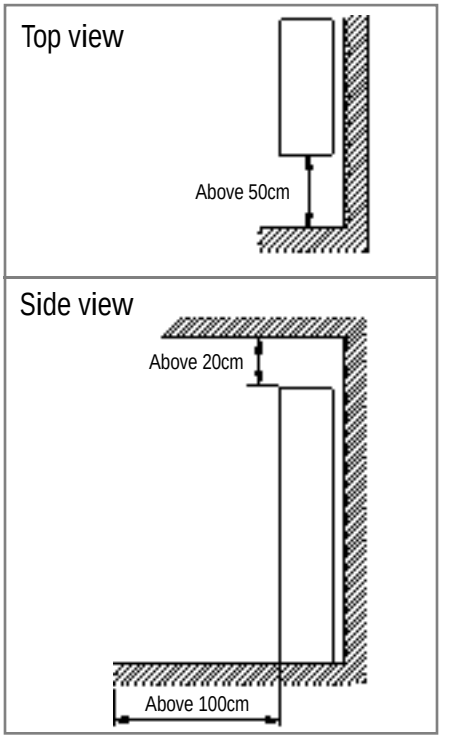
No.	Part Name		Q'ty	Remarks
1	Leg holder for indoor unit		4	Piping box
2	Screw	TH M4 X 12	4	
		TH M4 X 25	4	
3	Cable clamp	12N	2	Option(Piping box)
		8N	3	Piping box
		6N	1	
4	Indoor unit fixing holder		1	
5	Leg holder for outdoor unit		4	
6	Insulation rubber bottom		4	
7	Cable tie		5	
8	Putty		3	
9	Pipe band		3	
10	Rubber cabi slot		1	
11	Rubber cabi hole		1	
12	Drain plug out		1	

3-4 Installation

3-4-1 Selection of Installation Place

3-4-1(a) Indoor Unit

- Install the unit at a place close to the wall facing the outside as it is necessary to perform piping connection with the outdoor unit.
  - It is effective to install the unit at a window side to ensure uniform distribution of indoor temperature.
- Install the unit at a place where there is no obstacle against the wind around the air inlet and air outlet.
- Install the unit horizontally at a stable, rigid place. (When installing the unit at a place subjected to vibration, noise may occur.)
- Avoid a place near the door which is frequented by people.
- Avoid a place subject to direct sunlight.

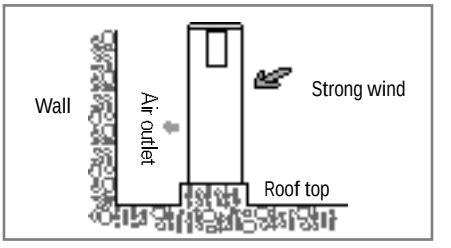


3-4-1(b) Outdoor Unit

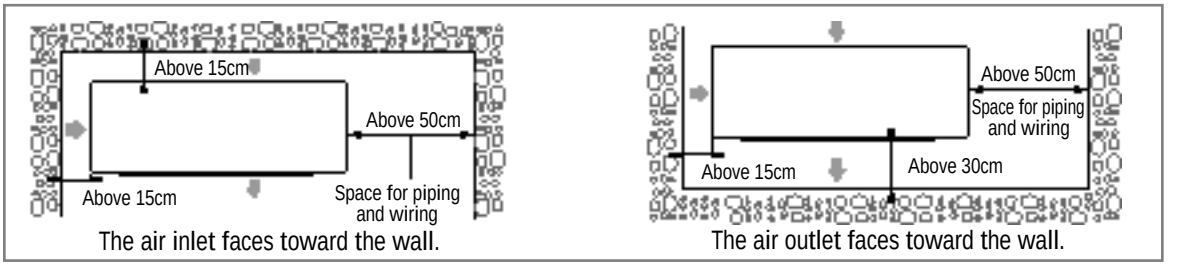
- Place free from the risk of combustible gas leakage.
- Place which can bear the weight of the unit.
- Place which can bear the fixing strength of the outdoor unit.
- Avoid a place subject to oil (including machine oil).
- Avoid a saline place.
- Avoid a place subject to sulfide gas (hot spring zone). (When installing the unit at such special environmental conditions, it may cause machine trouble. When it is unavoidable to use such places. It requires special maintenance.)
- A place where the discharge air and noise of the outdoor unit do not disturb the neighborhood. (Take special care not to cause any inconvenience to your neighbors when installing the unit on the borderline with your neighborhood.)
- A place where strong wind does not head against the air outlet of the outdoor unit. (If a strong wind heads directly against the air outlet at the time of cool operation, a safety device can be operated.)
- Do not install the outdoor unit at an unstable place such as outer wall of an apartment or building. The outdoor unit may fall down, causing severe personal or property damage or loss.

* If there is any unavoidable reason to install the unit at such a place, take the following measures against the wind;

1. When installing the unit at a roadside concentrated with buildings, install it parallel with the road.
2. Install the unit so that the air outlet faces toward the wall at a place such as rooftop, which may be subjected to strong wind.



* The outdoor unit should be installed in accordance with the service space.



3-4-2 Electrical Work

The electrical work should be performed by a specialist qualified for the work.

- Use the three phase power supply, and be sure to install the sub power distributing board for exclusive use with the unit(separately purchased by the user).
- * Avoid octopus-type wiring as it can cause a drop in voltage, thus resulting in poor performance of the automatic control circuit.
- Be sure to install circuit breaker (separately purchased by the user).
- Be sure to connect the grounding wire.

Electric power spec

Power		3phase 4wires 380V
Ampere of breaker		50 A
Knife switch	Switch	25 A
	Fuse	25 A
Size of grounding wire		2.5 mm^2
Min. size of electric wires from/to the indoor/outdoor unit		0.75 mm^2

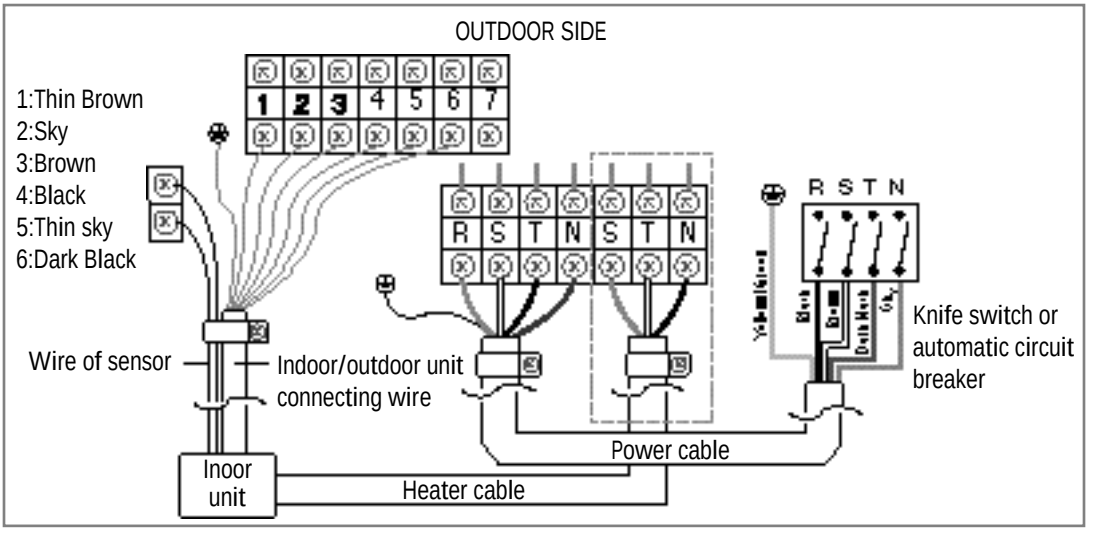
CAUTION

- Be sure to use the wires, and switches or fuses of power distribution board are qualified and fulfill the specification.
- Be sure to install knife switch or circuit breaker on the power distribution board.
- The electrical and grounding work should be performed as per " technical specification of electrical facilities " and " specification of internal wiring ".
- Be sure to connect main electrical input wires with bolted connectors using compressed terminal.

Applicable voltage 380V	342V ~ 418V

When connecting 3Phase 4wires 380V AC

1. Remove cover of electric box on side panel of outdoor unit.
2. Connect electric input wires (R,S,T,N) to each terminal (R,S,T,N) of the electric box on outdoor unit respectively.
3. Connect electric wires to each terminal on indoor and outdoor unit respectively.



CAUTION

- Be sure to connect electrical wires correctly, if not it can cause a trouble.
- * Be sure to fix wires from/to the indoor and outdoor unit on the piping insulated. Avoid wires contact to bare pipe or valve directly without any insulated spacer.

* Must be use the approval wire according to IEC or EN requirement.

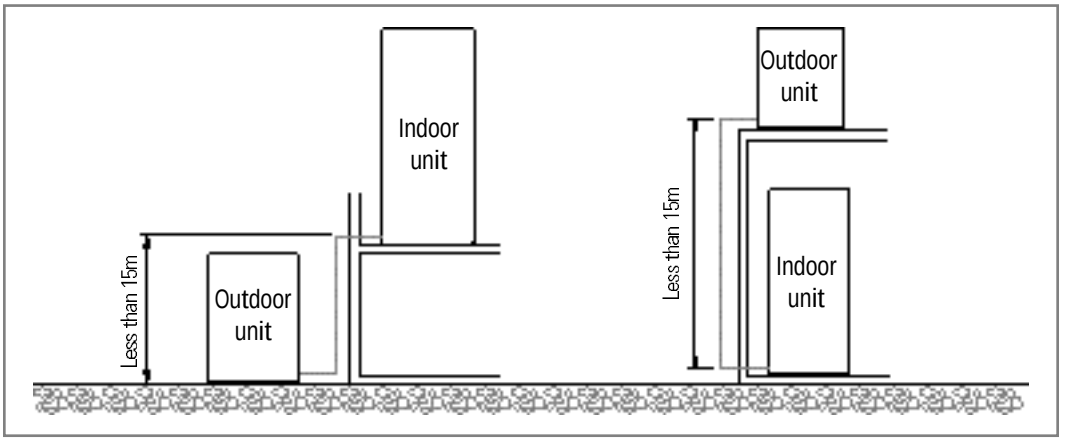
3-4-3 Installation Method

3-4-3(a) Installation Procedures

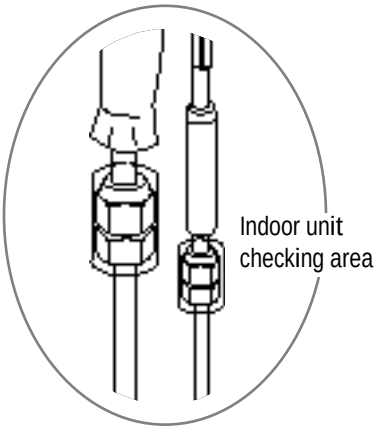
1. Open the inlet grille, and remove the flare nut.
2. Bend the connection pipe to an appropriate length using the spring bender depending upon the installation place.
   - Allowable pipe length : Maximum 25m
   - Allowable pipe drop distance : Maximum 15m
   - Make no more than ten bending points on the pipe
   - When the pipe length is in excess of the standard pipe length of 5m, add the refrigerant (R-22) of 50g for each additional 1m.

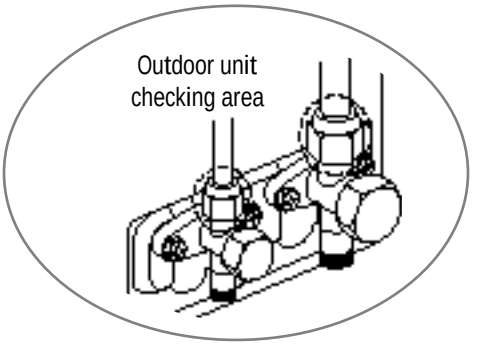
CAUTION

- If the pipe is lengthened, the performance of the unit is degraded, and the service life is shortened. Therefore, the pipe length should be as short as possible (less then 15m).



3. Install the high pressure pipe to the heat exchanger liquid pipe, and the low pressure pipe to the heat exchanger gas pipe respectively using the flare nut, taking care not to cause any leakage of refrigerant.
4. Be sure to insulate the pipe with appropriate insulation material.
5. Insert the drain hose into the drain pipe, and connect them by tying them to the cable tie to prevent any water leakage.
6. After completion of the installation, check the connecting area for any gas leakage.
7. Wind a finish tape when the wiring of the refrigerant pipe, the unit, and the drain piping are completed.

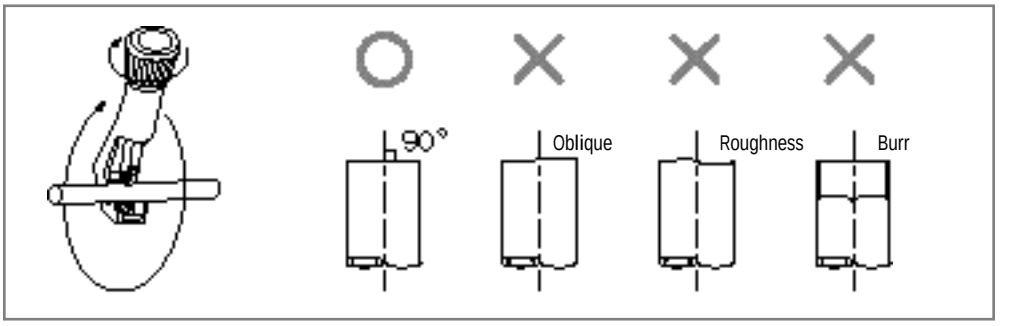




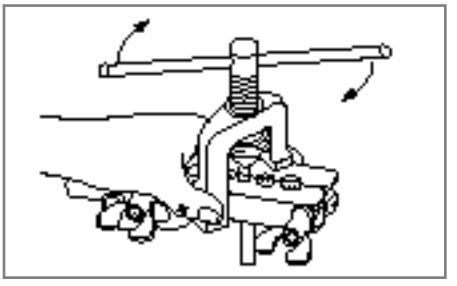
3-4-3(b) Connection of Refrigerant Piping

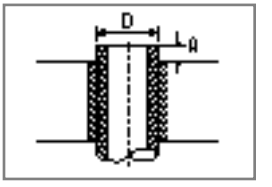
Flare Processing

1. Cut the pipe using the pipe cutter.



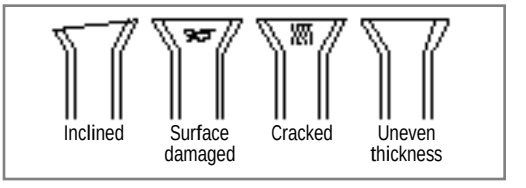
2. Insert the flare nut into the pipe, and then perform the flare processing.





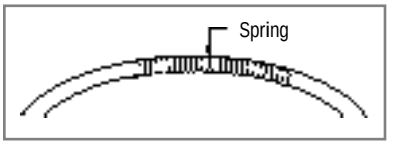
Outer Diameter	A (out / in)
ø 9.52mm	1.7 / 1.0 (mm)
ø 19.05 mm	2.2 / 1.5 (mm)

• Unproper flaring



Pipe Bending

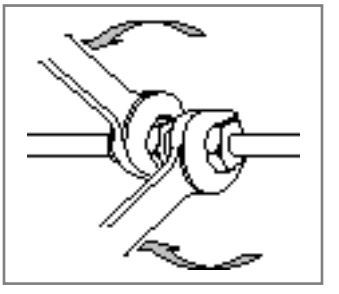
1. Perform bending of the pipe using the bender which has a specified bending radius.
2. Be sure to take full care to perform bending of the pipe successfully at one time.
   Bending and unbending the pipe more than twice makes the bending work increasingly difficult.
3. You may use the spring inserted into the gas pipe instead of the bender to bend the pipe.
4. When you bend the pipe using the spring, hold the pipe with both hands to prevent any distortion, and secure a minimum bending radius of more than 100mm.



Tightening of Connection Parts

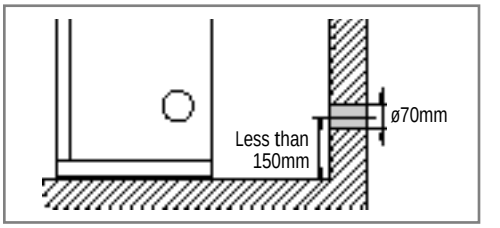
- Align the center of the connection piping, and tighten the flare nut by turning it with hand. Then tighten it again using the spanner in the direction as shown in the figure.

Outer Diameter	Tightening Torque	Final Torque	Remarks
ø 9.52mm	400 kg • cm	450 kg • cm	
ø 19.05mm	700kg • cm	750kg • cm	



3-4-3(c) Drilling a Hole in the Wall

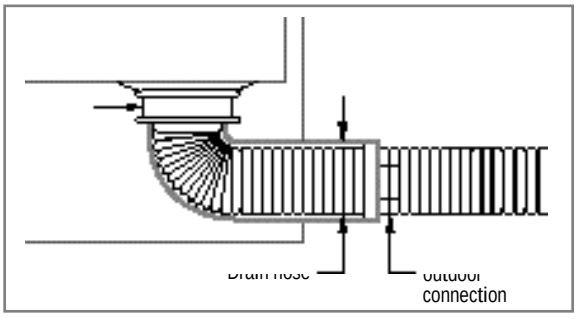
- Drill a hole of 70mm in diameter to the outside.
- The drilling should be done at a distance of less than 150mm from the floor facing the indoor unit.



3-4-3(d) Drain Hose

- Extend the drain hose to the drain hose connected to the drain pan, and fix it with the tape or a cable tie to prevent separation. Then make a covering of it so that water can not flow outwardly.

Piping Material	Vinyl Chloride(Outer diameter ø 16mm)
Insulator	Foamed Polyethylene

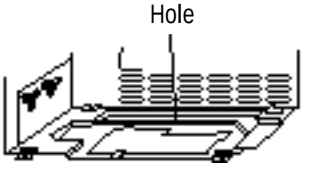


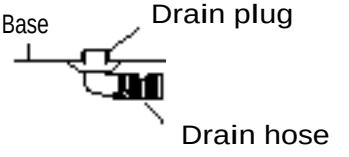
CAUTION

1. As the draining is of natural drain type, make the drain hose direct downward.
2. If there is any foreign substance in the drain plate, it may clog the drain pipe. Therefore, be sure to remove the foreign substance inside after installation.
3. After completion of installation, be sure to pour water into the drain pan, and then check the draining condition. (There is no problem in draining when the draining is completed within 20 seconds.)

- In heating and deice operation, condensed water may be generated. Install drain line as following procedure.

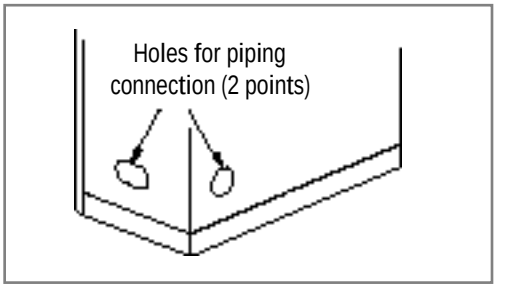
1. Insert the drain plug into base hole.
2. And then connect drain hose to drin plug.

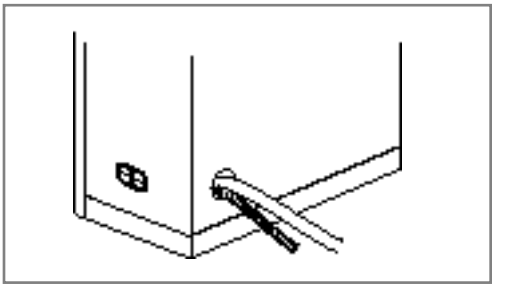




3-4-3(e) Rat-prevention Cover

- The piping of this unit can be connected to the left and rear side.
- When you hit the area for piping connection slightly with a hammer, a hole is made.
  - If there is any reason to change connection, fill in hole with ruber cabi slot.





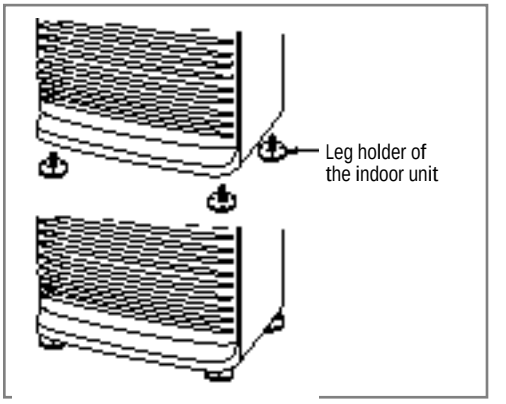
3-4-3(f) Indoor Unit

In order to install drain hose through wall, adjust height (max. 150mm) of the indoor unit using leg holder.

Fixing to the floor

- When using the leg holder of the indoor unit.

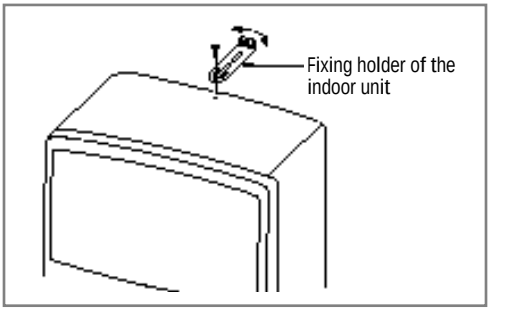
1. Lie down the unit on flat floor.
2. Insert the leg holders into screwed holes and then fasten them clockwise.
3. Turn the unit right and adjust horizontal line of it.
   * Mis-alignment of the unit can cause vibration and noise.



Fixing to the wall

- When using fixing holder of the indoor unit.

1. Fix the holder using long screw bolts on wall.
2. Fix the unit using two screw bolts or four anchor bolts.
   (Size of the screw hole on the holder is ø4.5mm and size of the bolt is ø6mm.)



3-4-3(g) Outdoor Unit

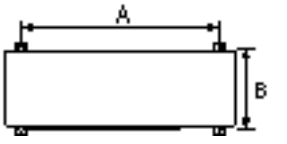
When using the anchor bolt

1. Fix the unit on a flat, rigid floor using the anchor bolt. (Anchor bolt : M10 x 4 points - separately purchased)

Anchor bolt fixing dimensions

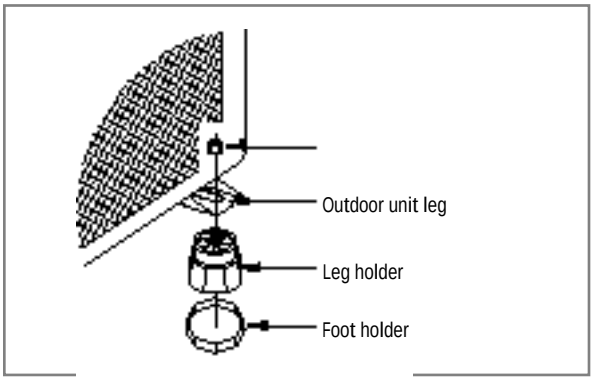
Unit:mm

A	840
B	415



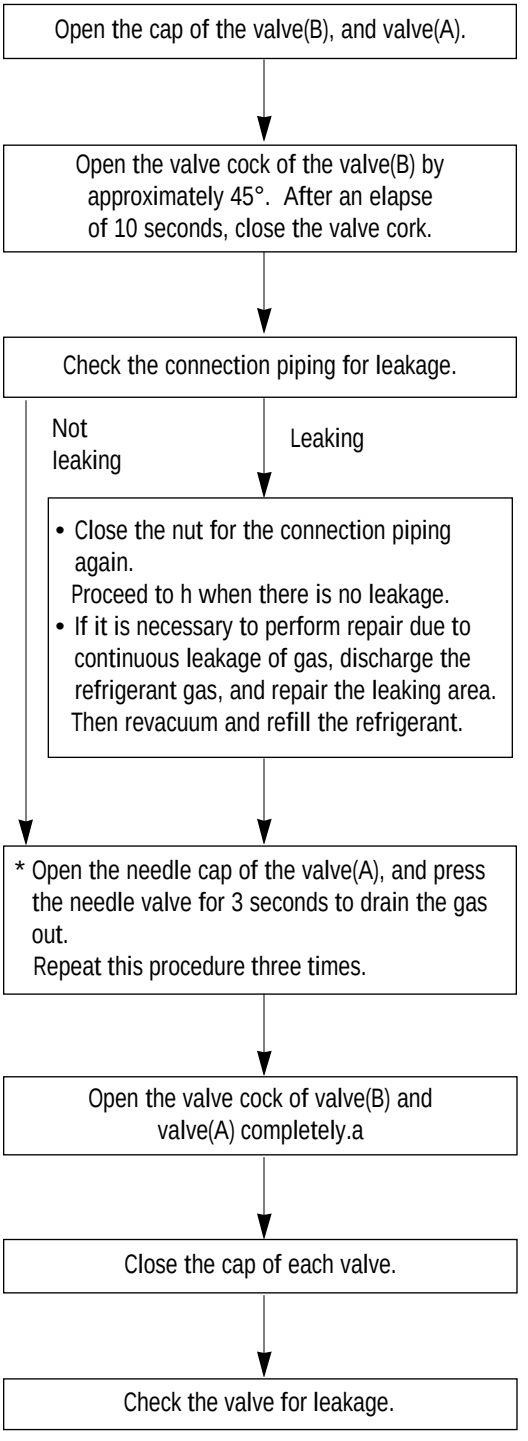
When using the leg holder of the outdoor unit

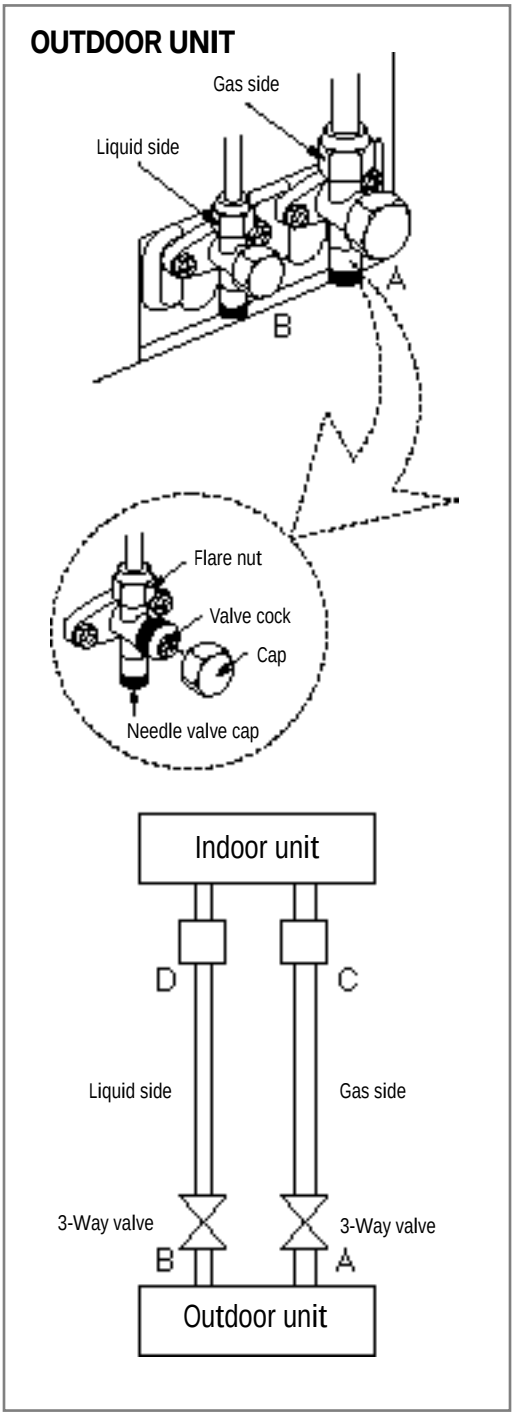
1. Insert the foot holder (4EA).
2. Remove the nut fastened to the leg holder, and then insert the leg holder into the hole of the outdoor unit leg.
3. Fix the unit securely with the nut.



3-4-3(h) Air Purge

- Be sure to perform the air purge of the indoor unit, and piping using the refrigerant of the outdoor unit at the time of installation.


Open the cap of the valve(B), and valve(A).
Open the valve cock of the valve(B) by approximately 45°. After an elapse of 10 seconds, close the valve cork.
Check the connection piping for leakage.
Not leaking
Leaking
• Close the nut for the connection piping again.
Proceed to h when there is no leakage.
• If it is necessary to perform repair due to continuous leakage of gas, discharge the refrigerant gas, and repair the leaking area.
Then revacuum and refill the refrigerant.
* Open the needle cap of the valve(A), and press the needle valve for 3 seconds to drain the gas out.
Repeat this procedure three times.
Open the valve cock of valve(B) and valve(A) completely.a
Close the cap of each valve.
Check the valve for leakage.



3-4-3(i) Refrigerant Charging

Air purge(at the time of new installation only)

↓

Close the gas pipe side valve by turning it clockwise.
Connect the pressure gauge to the low pressure side service valve, and then open the gas pipe side valve again.

↓

Connect it to the refrigerant filling tank.
(Turn the tank upside down : Fill the refrigerant in liquid form.)

↓

Start cooling operation.

↓

Check the pressure of the pressure gauge.
Check whether the low pressure side is within the range of 4.5~5.5kg/cm2G
(outside temperature 35°C).

↓

Open the tank and refill the refrigerant until arriving at the proper pressure.
(Refill the refrigent slowly checking the pressure.)

↓

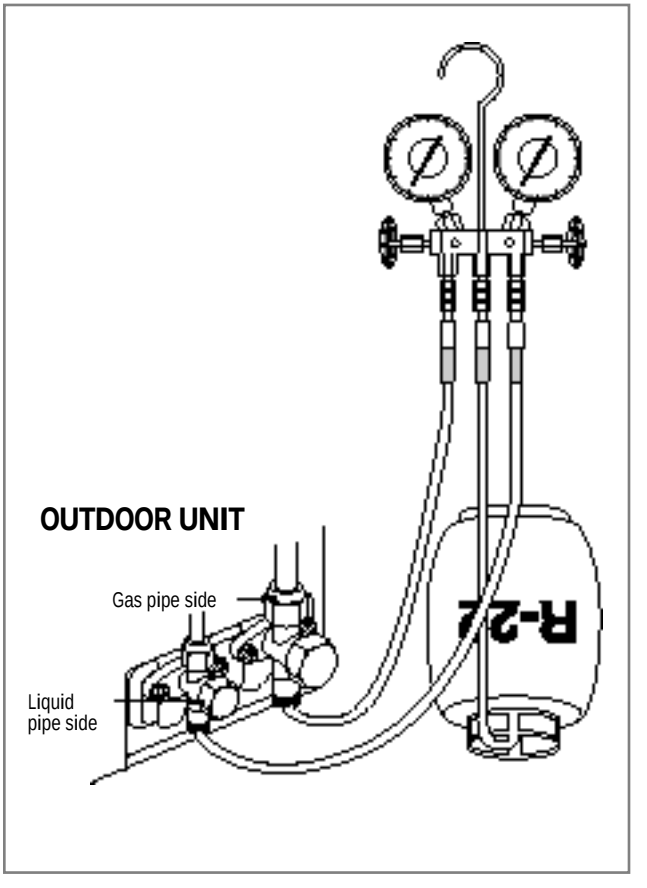
Stop operation.

↓

Close the gas pipe side valve, and loosen the pressure gauge connected.
Then open the gas pipe side valve again.

↓

Tighten the cap of each valve using a specified tool.

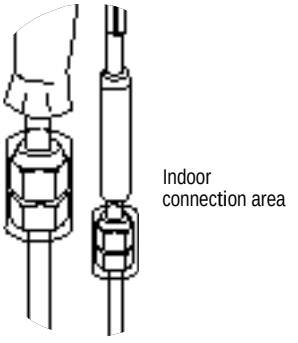


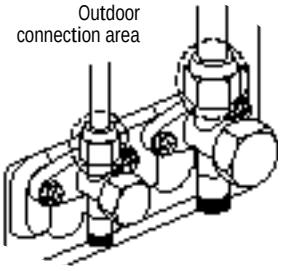
3-4-4 Check and Test Operation

3-4-4(a) Check

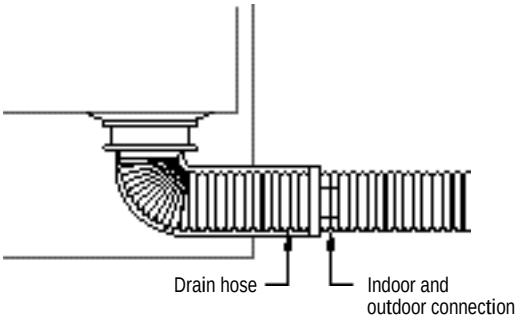
- Be sure to check the following again after completion of installation.

1. Check the piping connection area for any gas leakage.

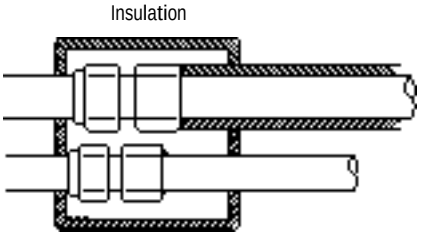




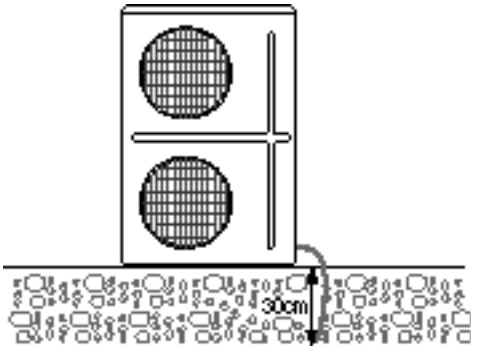
2. Is the drain hose properly connected?



3. Is the insulation of the piping in good condition?



4. Is grounding properly made?

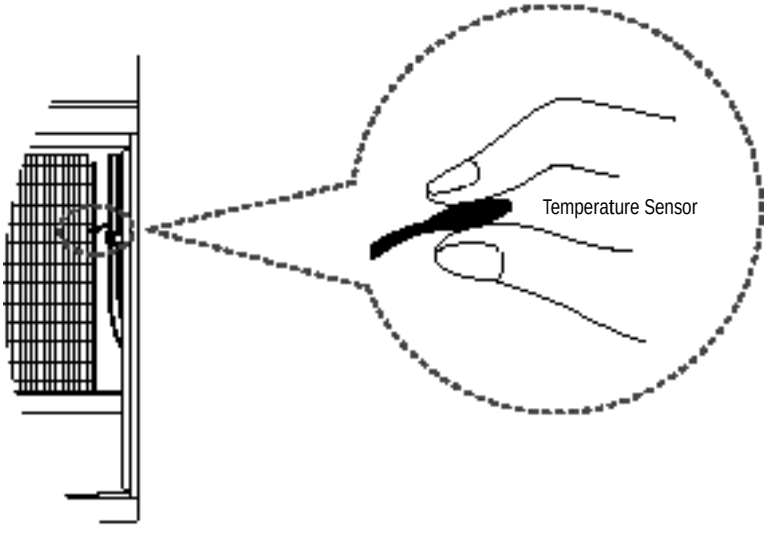


3-4-4(b) Test Operation

- After checking, read the owner's instructions carefully, and perform a test operation. Then deliver the unit to the customer.
  (When delivering the unit, be sure to read carefully and follow the contents of the owner's instructions.)

CAUTION

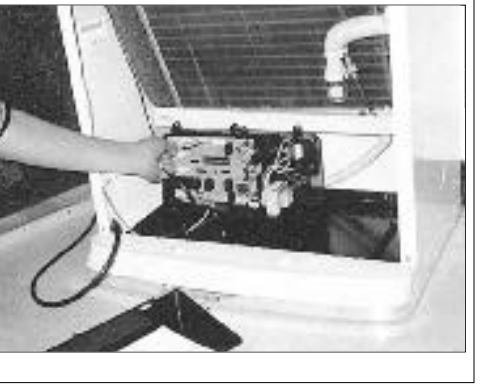
1. Be sure to check whether the service valve is opened before attempting to perform the test operation.
2. Never attempt to start test operation by force pressing the electronic contactor as it is very dangerous.
   (This is very dangerous as the protective device does not work.)
3. Be sure to perform the test operation after installation.
   It is easy to start the test operation in winter if you increase the sensor temperature to 23°C ~ 25°C by holding the indoor temperature sensor. (Cooling operation)

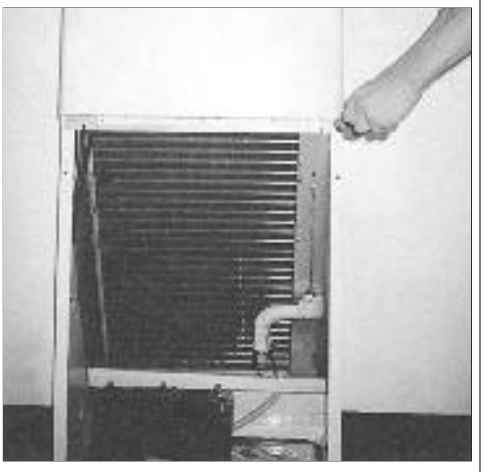


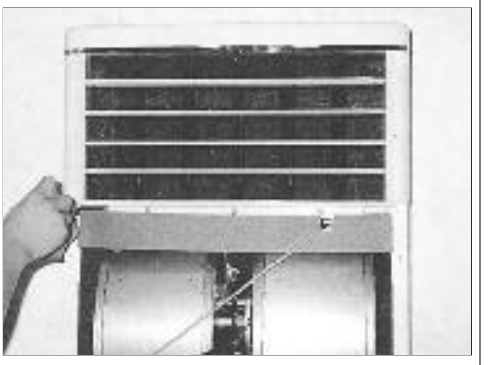
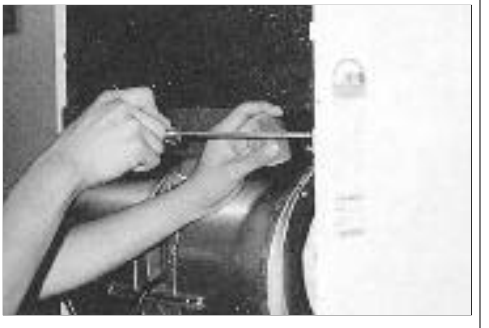
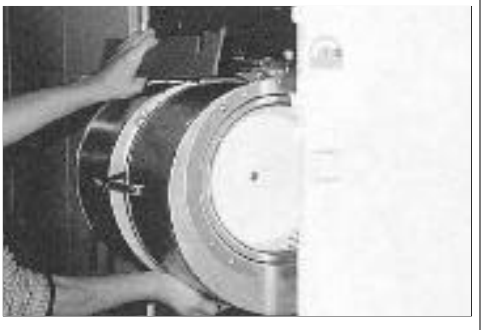
MEMO

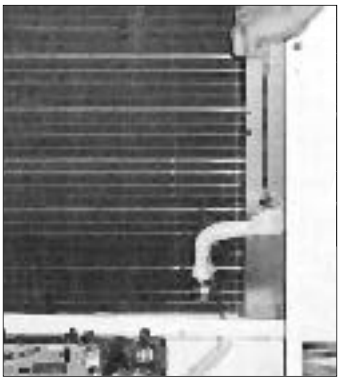
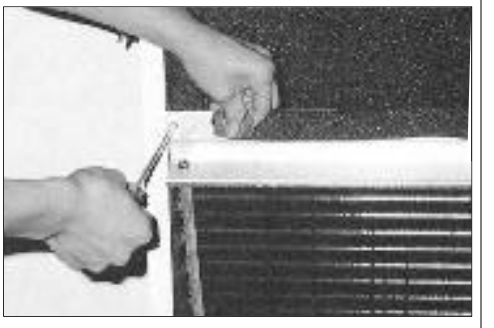
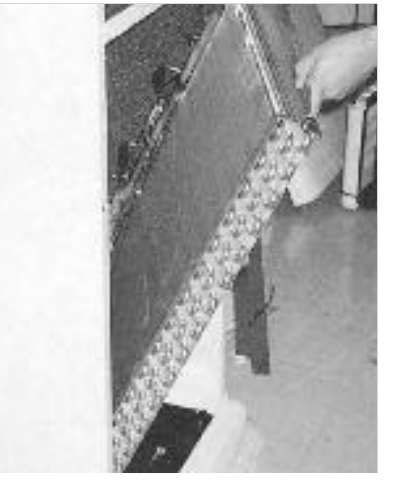
4. Disassembly and Reassembly

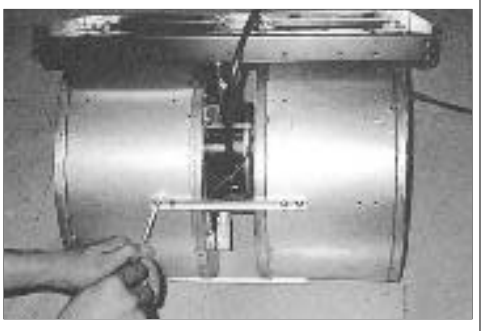
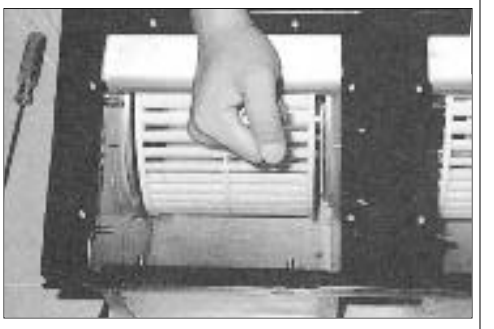
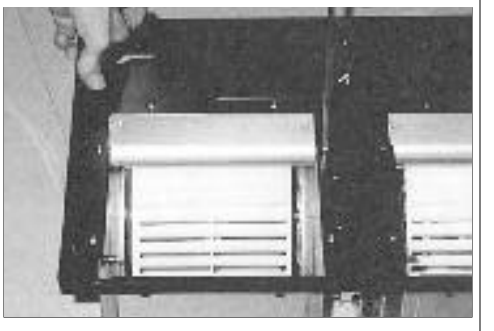
4-1 Indoor Unit

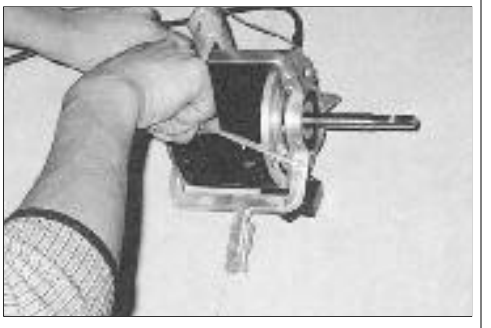
No	Parts	Procedure	Remarks
1	Indoor unit		
2	Inlet grille	1) Open the inlet grille and remove the connection ring.	
3	Main PCB	1) Separate the PCB connect wire after separating the control box cover. 2) Separate the connection wire to separate the front cover and duct. 3) The main PCB should be separated by turn over the mountain tab.	

No	Parts	Procedure	Remarks
4	Front cabi	1) The front cabi should be separated by giving strength downward after loosening 2 screws at the lower end.	
5	Plate top	1) The plate top should be separated by loosening screws.	

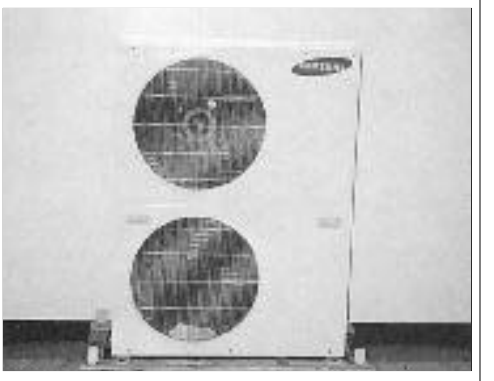
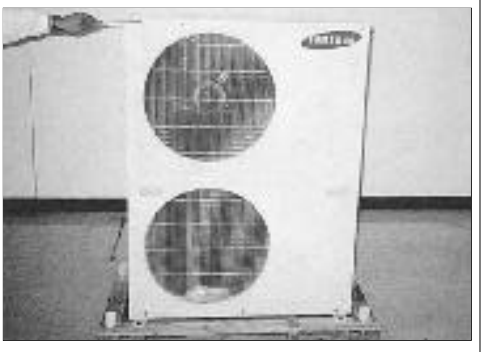
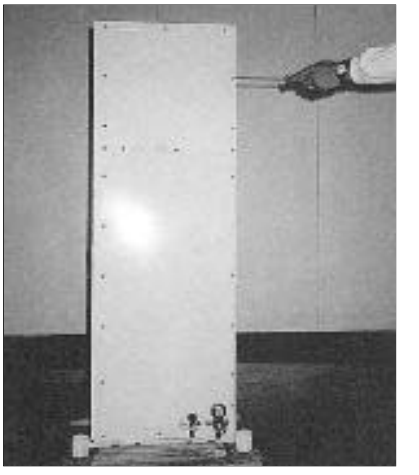
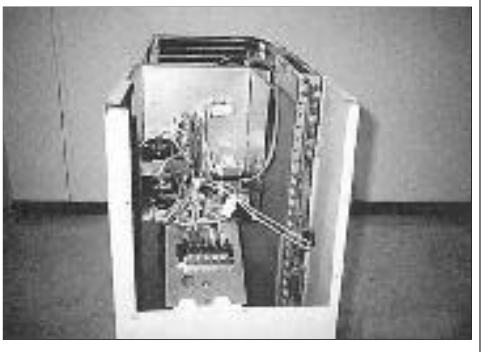
No	Parts	Procedure	Remarks
6	Ass'y grille out	1) First loosen screws at left and right sides of grille out.	
		2) Then the ass'y grille out should be separated by giving strength upward (↑).	
7	Ass'y Blower in	1) First loosen the 4 screws at left and right sides.	
		2) Then the ass'y duct should be separated by lifting it.	

No	Parts	Procedure	Remarks
8	Evaporator	1) First separate the cover after loosening the screws fixed at evap cover R.	
		2) Then separate the 3 screws fixed at cabinet BKT of evaporator BKT.	
		3) Evaporator should be separated by flinging ahead.	

No	Parts	Procedure	Remarks
9	Motor	1) When the ass'y duct should be separated from the motor, the 2 bracket should be separated first.	
		2) Then the bolts fixed at the blower and motor shaft should be separated.	
		3) Then the screws binding the holder top blower and duct should be separated.	
		4) The duct of one side should be separated as the picture shows after loosening the upper binder.	
		5) The binder of the motor and the duct should be separated.	

No	Parts	Procedure	Remarks
		6) Then the motor should be separated.	
		7) The bracket fixed at the motor should be separated.	
10	Panel PCB	1) Should be separated after loosening the insulating material and binders at the back of the front side.	

4-2 Outdoor Unit

No	Parts	Procedure	Remarks
1	Outdoor unit	1) Packaged air conditioner outdoor unit	
		2) The binders of the front side should be separated.	
		3) The flank and the binders should be separated from each other.	
2	Control box	1) Connect distributed wires in the control box.	

MEMO

5. Troubleshooting

	Troubleshooting
First,	Items to be checked first
Second,	Check the corrective actions in the case of occurrence of self-diagnosis mode
Third,	When the trouble is not related to the 1st or 2nd items above, check the troubled area in detail in accordance with the fault analysis method by symptom.

5-1 Items to be checked first

1) Is the supply voltage appropriate?
   The supply voltage: should be AC 187V-AC 253V/60Hz
2) Is the connecting wire between the indoor unit and outdoor unit appropriate?
   Be sure to check whether the cables for the indoor unit and outdoor unit are securely connected by the same terminal number.
3) When any claim occurs according to the contents of the table below, it is not related the trouble of the air-conditioner at all.

No.	Operation of air-conditioner	Description
1	The compressor does not operate even though the desired temperature is set lower than room temperature (during the cooling operation)	The compressor operation is delayed for 3 minutes for the protection of it during the restart of compressor. It operates normally after 3 minutes delay even at the initial operation.
2	The hot wind does not come out even though the desired temperature is set higher than the room temperature. (heating operation)	In order to prevent the discharging of cool wind, the room fan motor operates only when the temperature of indoor heat exchanger is kept higher than a constant one.
3	The wind quantity is not controlled during the automatic (cooling/heating) turbo operation.	The wind quantity is set by the micom during the automatic turbo operation.
4	The temperature can not be set during the automatic (cooling/heating) turbo blowing operation.	The desired temperature is set automatically during the automatic turbo operation. The wind blowing operation is simply the operation mode for the circulation of indoor air.

5-2 Self-diagnosis and corrective actions

No.	Temperature display	Cause	Corrective actions
1	E1	Short of indoor temperature sensor Open of Indoor temperature sensor	Check of departure of indoor temperature sensor Check of PCB open/short
2	E5	Short of indoor heat exchanger sensor Open of indoor heat exchanger sensor	Check of indoor exchanger sensor departure Check of PCB open/short Replacement of sensor
3	E6	Short of outdoor heat exchanger sensor Open of outdoor heat exchanger sensor	Check of outdoor exchanger sensor departure Check of PCB open/short Replacement of sensor
4	E7	Short of heater temperature sensor Open of heater temperature sensor	Check of heater wiring diagram Check of sensor attachment location
5	EL	When the electrical heater is over heated	Check of heater temperature sensor departure Check of PCB open/shore Replacement of sensor

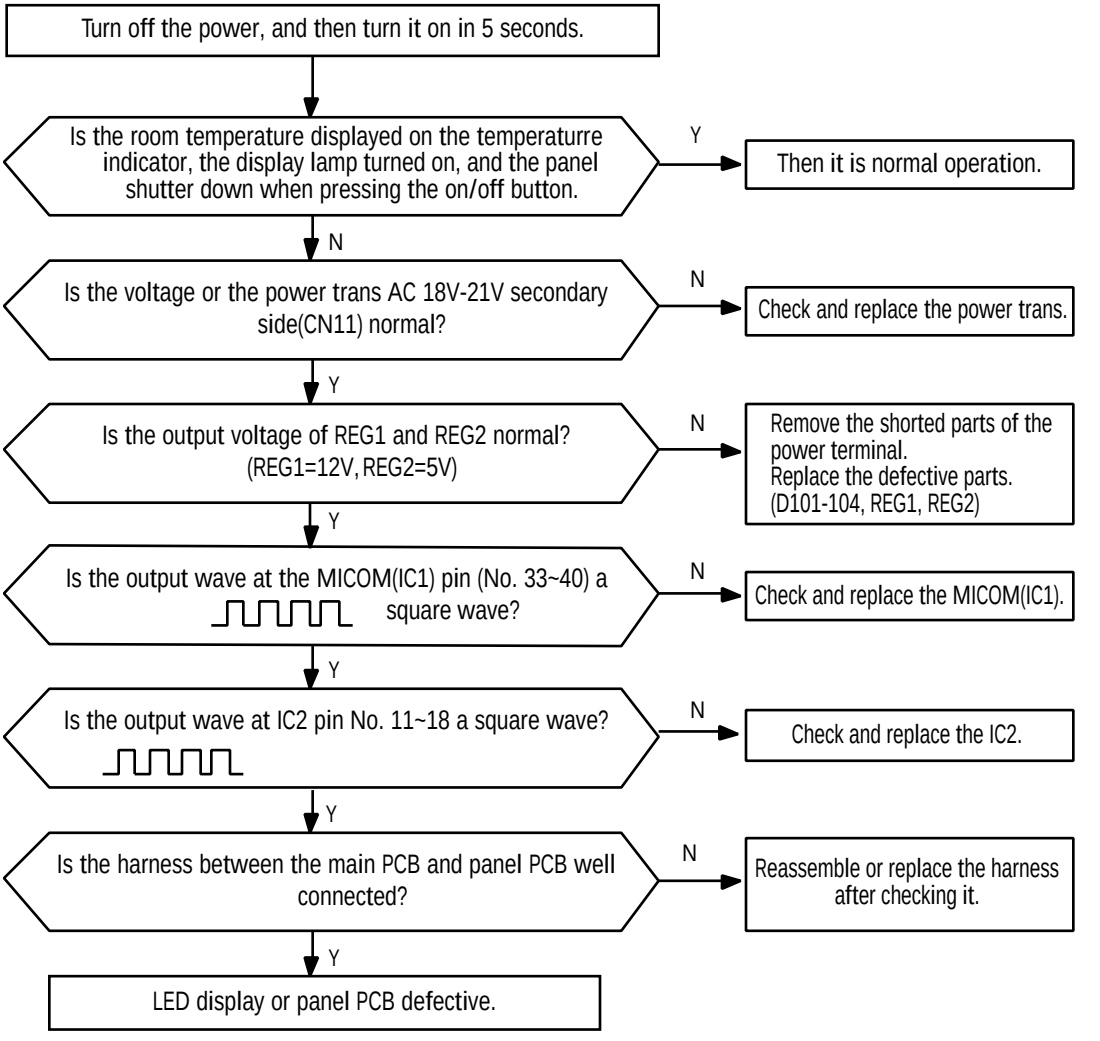
5-3 Fault Analysis by Symptom

5-3-1 No Power (No display)

1) Checkpoints

(1) Is the voltage of the power source normal?(AC 187V - AC 253V)
(2) Is the power line in good contact?
(3) Check the power fuse(F701, F702) and PCB fuse(F101) for open.
(4) Are the primary and secondary sides of the power-trans in good contact with the connector?
(5) Is the output voltage of REG1(KA7812) normal?(DC 11.5V - DC 12.5V)
(6) Is the output voltage of REG2(KA 7805) normal?(DC 4.5V - DC 5.5V)

2) Checking procedures(after checking the checkpoints of clause 1)

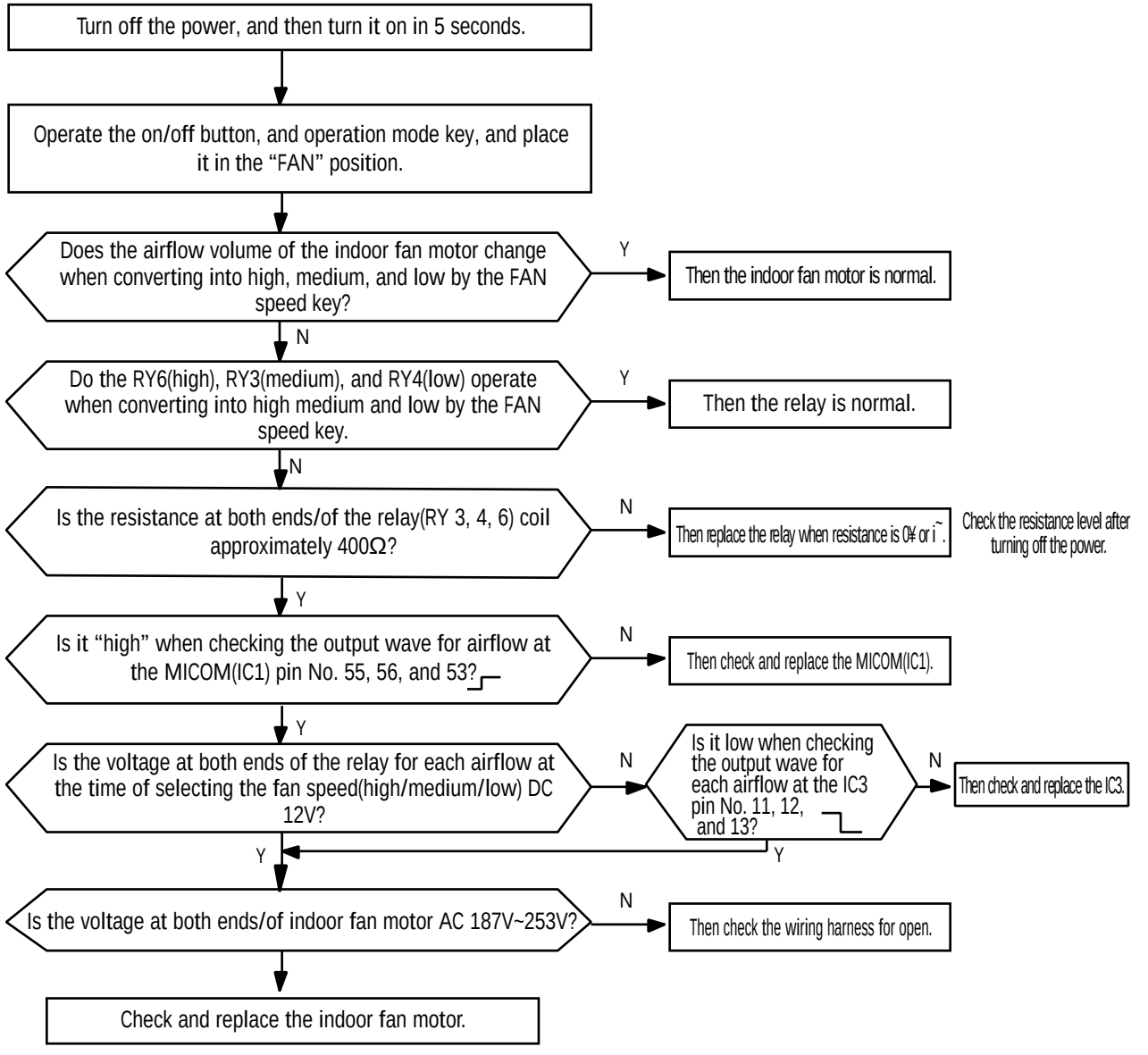

Turn off the power, and then turn it on in 5 seconds.
Is the room temperature displayed on the temperaturre indicator, the display lamp turned on, and the panel shutter down when pressing the on/off button.
Y
Then it is normal operation.
N
Is the voltage or the power trans AC 18V-21V secondary side(CN11) normal?
N
Check and replace the power trans.
Y
Is the output voltage of REG1 and REG2 normal? (REG1=12V, REG2=5V)
N
Remove the shorted parts of the power terminal.
Replace the defective parts.
(D101-104, REG1, REG2)
Y
Is the output wave at the MICOM(IC1) pin (No. 33~40) a square wave?
N
Check and replace the MICOM(IC1).
Y
Is the output wave at IC2 pin No. 11~18 a square wave?
N
Check and replace the IC2.
Y
Is the harness between the main PCB and panel PCB well connected?
N
Reassemble or replace the harness after checking it.
Y
LED display or panel PCB defective.

5-3-2 When the Indoor Fan Motor does not Operate.

1) Checkpoints

(1) Is the voltage of the power source normal?(AC 187V-AC 253V)
(2) Is the indoor fan connector (CN71) in good contact?
(3) Is the starting condensor of the fan motor in good contact with the terminal?
(4) Is the resistance at both ends of the relay coil approximately 400Ω?

2) Checking procedures(after checking the checkpoints of clause 1)

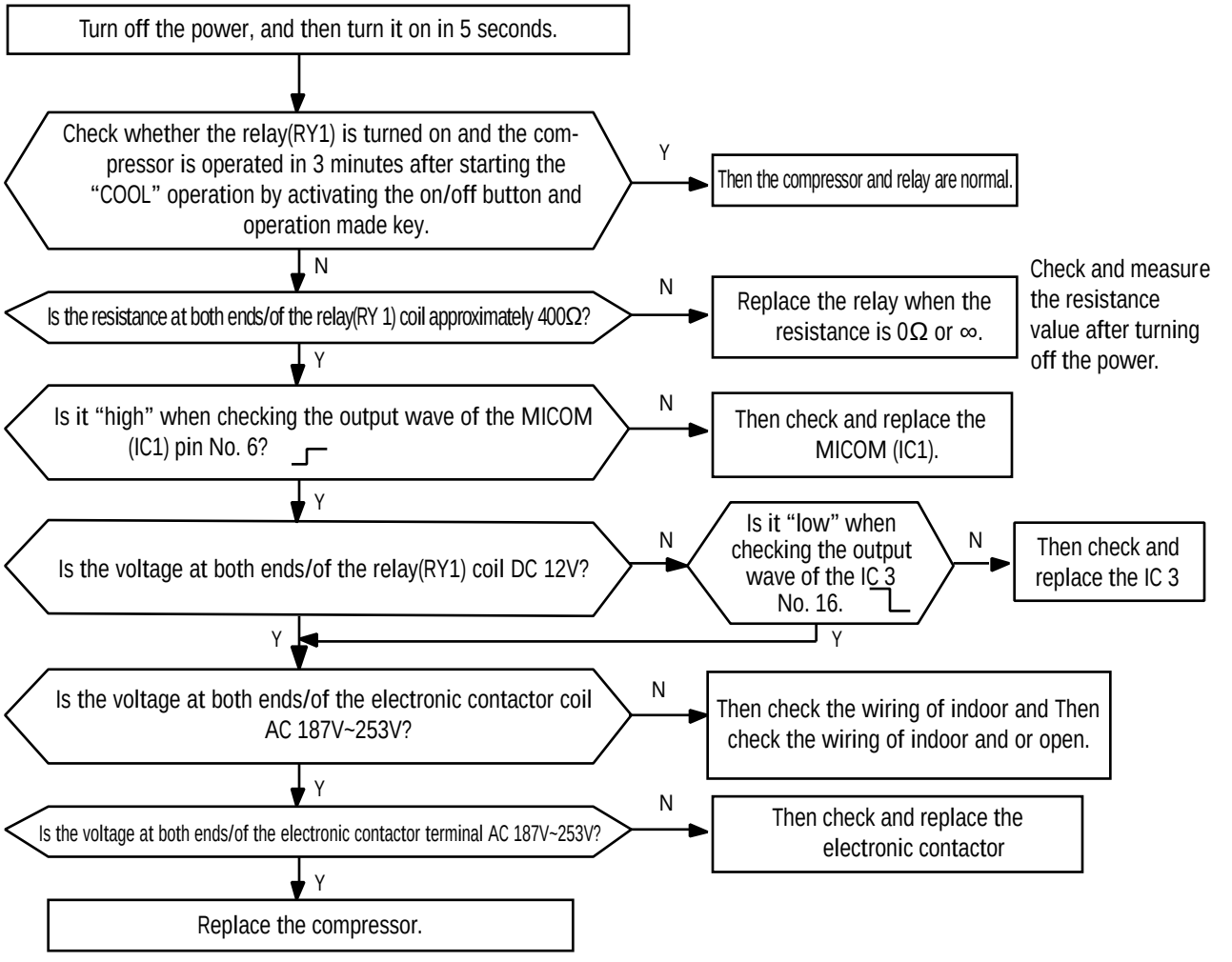

Turn off the power, and then turn it on in 5 seconds.
Operate the on/off button, and operation mode key, and place it in the "FAN" position.
Does the airflow volume of the indoor fan motor change when converting into high, medium, and low by the FAN speed key?
Y
Then the indoor fan motor is normal.
N
Do the RY6(high), RY3(medium), and RY4(low) operate when converting into high medium and low by the FAN speed key.
Y
Then the relay is normal.
N
Is the resistance at both ends/of the relay(RY 3, 4, 6) coil approximately 400Ω?
N
Then replace the relay when resistance is 0¥ or i~.
Check the resistance level after turning off the power.
Y
Is it "high" when checking the output wave for airflow at the MICOM(IC1) pin No. 55, 56, and 53?
N
Then check and replace the MICOM(IC1).
Y
Is the voltage at both ends of the relay for each airflow at the time of selecting the fan speed(high/medium/low) DC 12V?
N
Is it low when checking the output wave for each airflow at the IC3 pin No. 11, 12, and 13?
N
Then check and replace the IC3.
Y
Y
Is the voltage at both ends/of indoor fan motor AC 187V~253V?
N
Then check the wiring harness for open.
Check and replace the indoor fan motor.

5-3-3 When the Compressor Does not Operate

1) Checkpoints

(1) Is the voltage of the power source normal?(AC 187V - AC 253V)
(2) Is the desired temperature set at a higher level than the current temperature at the time of “Cool” operation?
(3) Is the power-in good contact with the comp. connector(GT 1, 2, 3, 4, 5)?
(4) Check the wirings of the outdoor and indoor unit for a wrong connection or poor contact.
(5) Isn’t the compressor in a 3-minute stand-by state?

2) Checking procedures(after checking the checkpoints of clause 1)

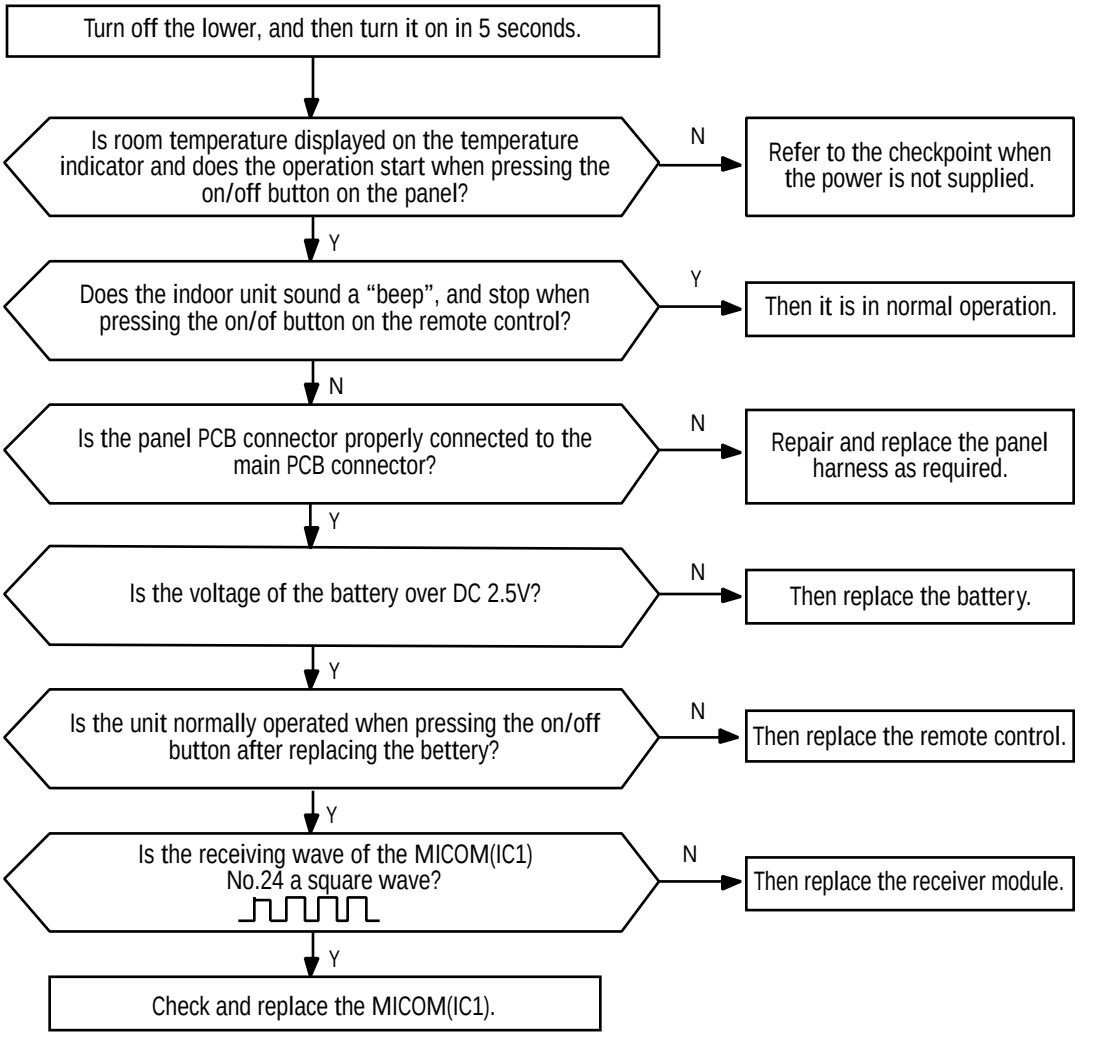

Turn off the power, and then turn it on in 5 seconds.
Check whether the relay(RY1) is turned on and the compressor is operated in 3 minutes after starting the “COOL” operation by activating the on/off button and operation made key.
Y
Then the compressor and relay are normal.
N
Is the resistance at both ends/of the relay(RY 1) coil approximately 400Ω?
N
Replace the relay when the resistance is 0Ω or ∞.
Check and measure the resistance value after turning off the power.
Y
Is it “high” when checking the output wave of the MICOM (IC1) pin No. 6?
N
Then check and replace the MICOM (IC1).
Y
Is the voltage at both ends/of the relay(RY1) coil DC 12V?
N
Is it “low” when checking the output wave of the IC 3 No. 16.
N
Then check and replace the IC 3
Y
Y
Is the voltage at both ends/of the electronic contactor coil AC 187V~253V?
N
Then check the wiring of indoor and Then check the wiring of indoor and or open.
Y
Is the voltage at both ends/of the electronic contactor terminal AC 187V~253V?
N
Then check and replace the electronic contactor
Y
Replace the compressor.

5-3-4 When the remote control does not operate

1) Checkpoint

The sounds “beep” when it receives the signal of the remote control.

2) Checking procedures


Turn off the lower, and then turn it on in 5 seconds.
Is room temperature displayed on the temperature indicator and does the operation start when pressing the on/off button on the panel?
N
Refer to the checkpoint when the power is not supplied.
Y
Does the indoor unit sound a “beep”, and stop when pressing the on/of button on the remote control?
Y
Then it is in normal operation.
N
Is the panel PCB connector properly connected to the main PCB connector?
N
Repair and replace the panel harness as required.
Y
Is the voltage of the battery over DC 2.5V?
N
Then replace the battery.
Y
Is the unit normally operated when pressing the on/off button after replacing the bettery?
N
Then replace the remote control.
Y
Is the receiving wave of the MICOM(IC1) No.24 a square wave?
N
Then replace the receiver module.
Y
Check and replace the MICOM(IC1).

5-4 PCB Inspection

5-4-1 Inspection Precautions

1. Be sure to check whether the AC sub power switch is removed when removing the main PCB or panel PCB.
2. Do not hold the outside of the main PCB or panel PCB with the hand or aply excessive force to it.
3. When connecting or removing the connector to the main PCB or panel PCB, do not pull the lead wire, but hold the entire assembly with the hand.

5-4-2. Inspecting procedures

1. When there is any trouble with the main PCB or panel PCB, check the connector for a poor connection, and the PCB or copper-clad pattern for separation.
2. The PCB is composed of the following two parts;
   - Main PCB: The main PCB is composed of the micom and peripheral circuit, relay drive sensor drive circuit, DC 5V power circuit, DC 12V power circuit and buzzer drive circuit.
   - Panel PCB: The panel PCB is composed of the LED display key and remote control.

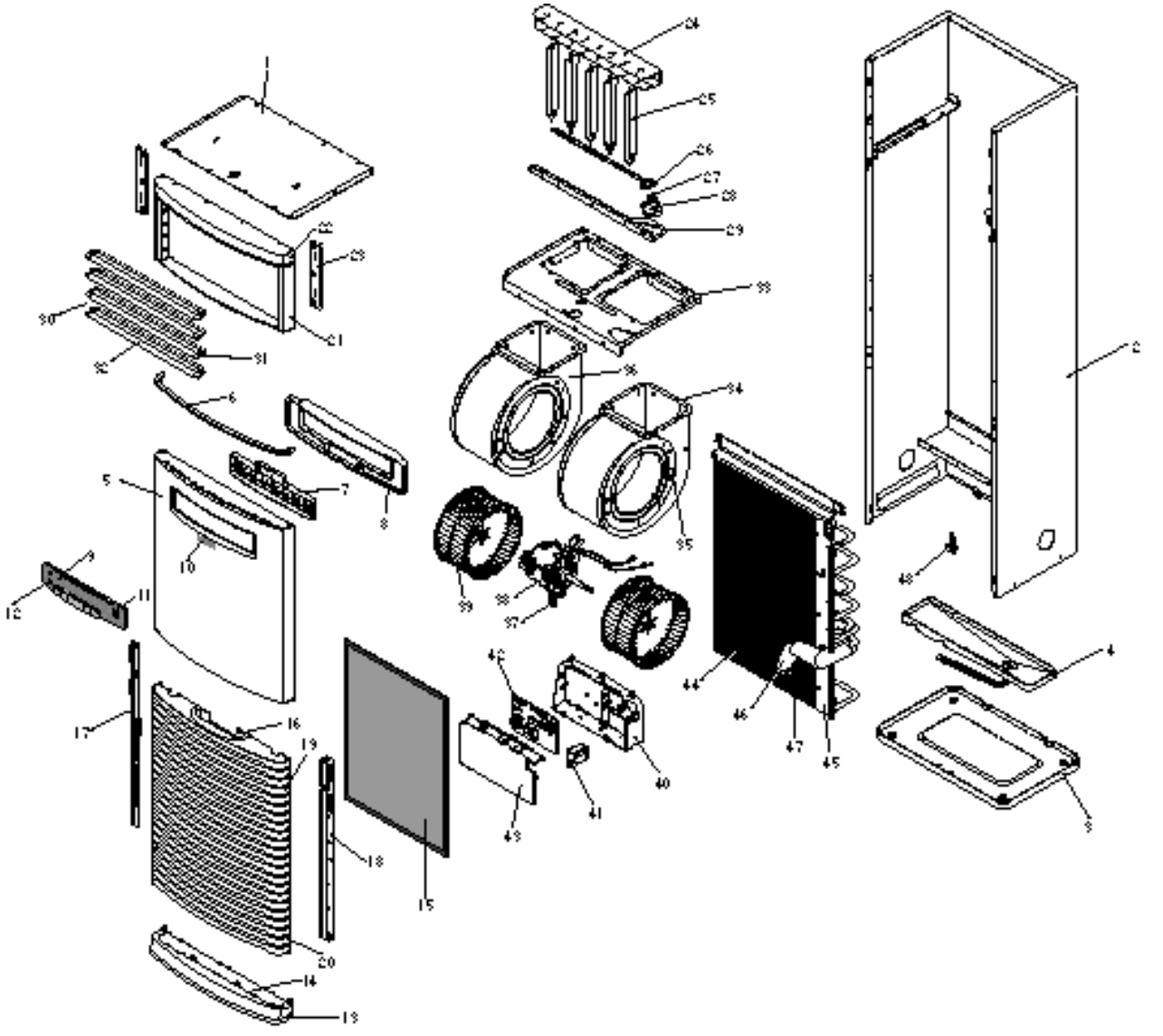
5-4-3. Detailed inspection procedures

NO	Procedures	Checking method	Cause of trouble
1	Turn off the sub power switch, and then check PCB fuse.	1) Is the fuse blown?	1) Overvoltage? 2) Indoor fan motor short?
2	1. Apply the supply voltage 2. When power lamp and LED display operate after pressing the on/off button, it is not related to items 1)~4).	Check the supply voltage 1) Is the voltage between both ends/of the trans connector “AC187V~AC253V” (GT6, GT7) 2) Voltage between both terminals of the CN 11 AC15V~ AC22V 3) Is the voltage between both terminals of the REG1 (KA 7812) out and GND DC 12V? 4) Is the voltage between both terminals of the REG2 (KA7805) out and GND DC 5V?	1) Power cord faulty, poor connection of indoor and outdoor unit, fuse blown, wrong wiring of power cables. 2) Power trans faulty. Power circuit faulty. 3) Power circuit faulty load short. 4) Power circuit faulty, load short.
3	Set the unit to “COOL” operation mode by the “ON/OFF” button and mode selector key. 1. Cool operation 2. Set the desired temperature at a sufficiently lower level than the current temperature.	1) The compressor does not operate.	1) The relay(RY1) for driving the electronic contractor does not operate. 2) Electronic contactor faulty.
4	Set the unit to “HEAT” operation mode by the “ON/OFF” button and mode selector key. 1. Heat operation 2. Set the desired temperature at a sufficiently lower level than the current temperature.	1) The compressor does not operate.	1) The relay(RY1) for driving the electronic contactor does not operate. 2) Electronic contactor faulty.
5	Set the unit to “HEAT” operation mode by the “ON/OFF” button and mode selector key. 1. Heat operation 2. Set the desired temperature at a sufficiently lower level than the current temperature.	1) Is the voltage between the com terminal and the high, medium, and low terminal of the indoor fan motor connector AC187V~AC253V? (When selecting each fan speed) 2) The indoor fan motor does not turn.	1) Indoor fan motor faulty. 2) Starting condenser faulty.

MEMO

6. Exploded Views and Parts List

6-1 Indoor Unit

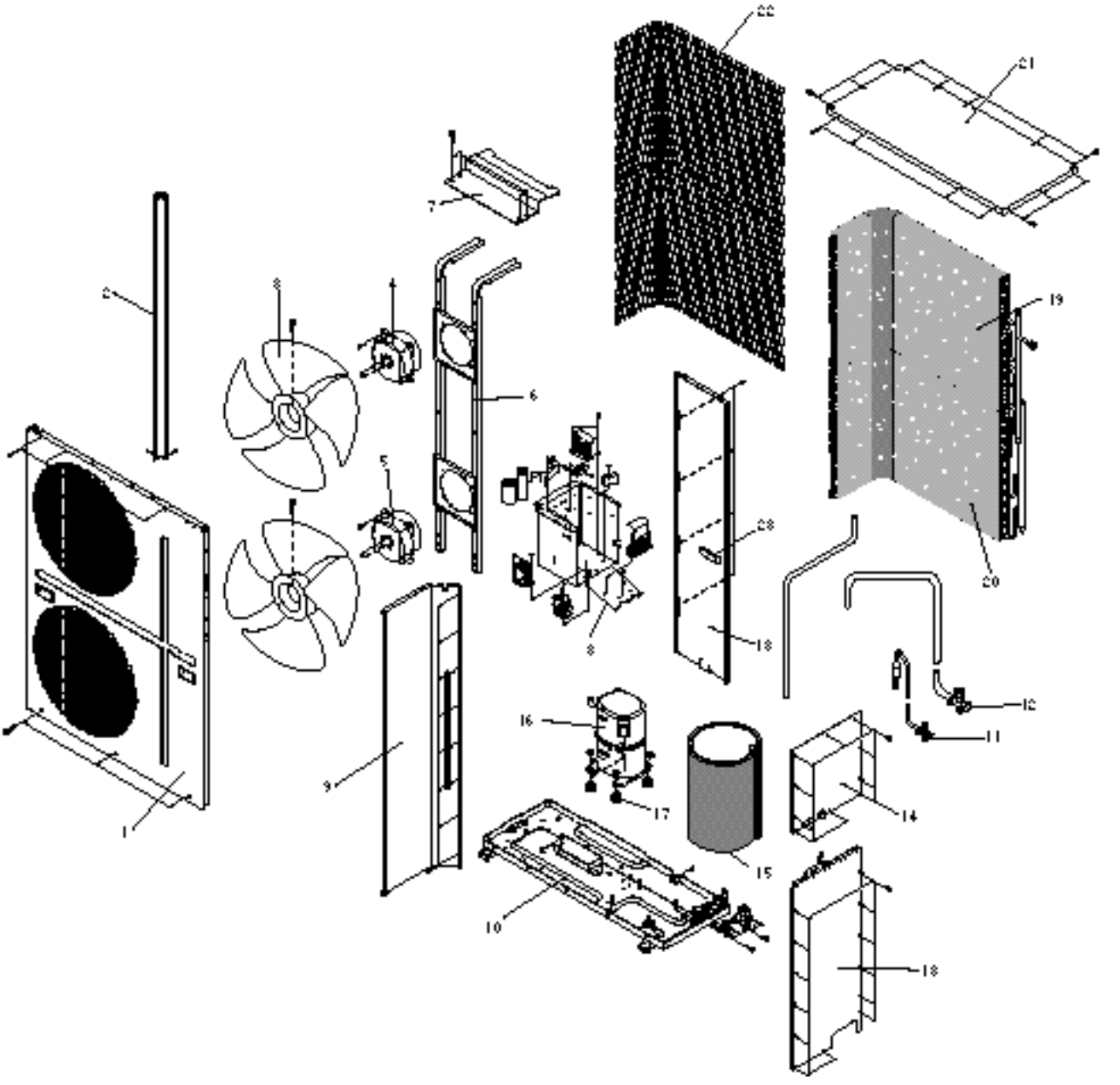


■ PART LIST

No	CODE-NO	DESCRIPTION	SPECIFICATION	Q'TY	REMARKS
1	DB70-10271A	PLATE-TOP	SECC-P, -, -, -, -, SC-94445T	1	
2	DB90-10561A	ASS'Y-CABI IN	AP-1100, L1810590°ø363	1	
3	DB90-20171B	ASS'Y-BASE IN	SAH-2017, 2517, SECC-P(20/20)	1	
4	DB91-90012C	ASS'Y-DRAIN PART	AP-1604CR, -	1	
●	DB90-40113F	ASS'Y-CABI FRONT	Heater only model	(1)	Option
	DB90-40113D	"	Non heater model	(1)	
5	DB90-10175A	ASS'Y-CABI FRONT IN	SA-165CH, LAMINATED	1	
6	DB64-50076A	DECORATION-LOW	ABS, -, -, -	1	
7	DB63-10027A	COVER-CONTROL	ABS, -, -, -	1	
8	DB63-10432A	"	EPS	1	
9	DB93-40232T	ASS'Y-CONTROL PANEL	Heater only model	(1)	Option
	DB93-40232V	"	Non Heater model	(1)	
10	DB64-30011D	BRAND-SAMSUNG	KOAL, T1.6, W11.5, L70, BLK, -	1	
11	DB64-50019A	KNOB-A	ABS, CR, SAH-165CH, -	1	
12	DB64-50020A	KNOB-B	ABS, CR, SAH-165CH, -	2	
13	DB64-50069A	DECORATION-DIE	ABS, GRY, SAH-165CH, -	1	
14	DB61-30501A	BRACKET-DECO LOW	SECC-P(20/20), T2.0, SC-4	1	
15	DB74-10079A	FILTER-PRE	PE, T0.3, AP-110	1	16~20 ASS'Y
●	DB92-10007B	ASS'Y-GRILLE IN	SAH-165CH, -	1	
16	DB67-90005A	BASKET-PEMOCON	SAH-2016/2516	1	
17	DB61-30108A	BASKET-GRILL LF	SC-9444ST, SAH-165CH	1	
18	DB61-30109A	BASKET-GRLL RH	SC-94445T, SAH-165CH	1	
19	DB64-10035A	GRILLE INLET UP	ABS, SAH-2016/2516	1	
20	DB64-10036A	GRILLE INLET LOW	ABS, SAH-2016/2516	1	21~29 ASS'Y
●	DB92-10298A	ASS'Y-GRILLE OUT	AP-1100, -	1	
21	DB64-10034A	GRILLE OUTLET	ABS, SAH-2016/2516	1	
22	DB64-50075A	DECO UP	ABS, SAH-2016/2416	1	
23	DB61-40034A	HOLDER OUT GRILL	SECC-P(20/20), BLK	2	
24	DB61-40235A	HOLDER-BLADE UP	SGCCM, T1, -, L564	1	
25	DB66-30156A	BLADE-V	PC ABS, T3, 5, -	5	
26	DB66-60026A	LINK-BLADE V	PC ABS, T2, 12, -, -, -	1	
27	DB68-70001A	CAM BLADE	POM	1	
28	DB95-20065E	ASS'Y-MOTOR SWING	516RPM M2LA49ZR32, -	1	
29	DB61-40234A	HOLDER-BLADE LOW	SGCCM, T1, -, L564	1	31, 32 ASS'Y
30	DB92-20017A	ASS'Y BLADE H	SAH-2016/2516	4	
31	DB61-40037A	HOLDER-BLADE	ZN-DC1, -, -, SAH-165CH	2	
32	DB66-30070A	BLADE-H	SECC-P, T0.5, 230, -	1	33~39 ASS'Y
●	DB94-30143C	ASS'Y BLOWER IN	APH450PG, 6uF	1	
33	DB61-40233A	HOLDER-TOP BLOWER	SGCCM, T2.0, -, AP-1100	-	
34	DB90-40112B	ASS'Y-CASE DUCT R	AP-1100, T0.8	1	
35	DB63-10431A	COVER-BELL MOUTH	SGCCM, T0.8, -, -, M, AP-1100	4	
36	DB90-40112A	ASS'Y CASE DUCT L	AP-1100, T0.8	1	
37	DB61-30507A	BRACKET-MOTOR IN	SGCCM, T2.0, -, AP-1100	3	
38	DB95-20136E	ASS'Y-MOTOR IN	APH450PG	-	
39	DB67-50003A	BLOWER	ABS, -, -	2	
40	DB61-10023A	CASE-CONTROL	ABS, -, -, BLK, -, -	1	
41	DB26-10070A	TRANS-POWER	DC17, AC230, -, -, -, DC17, DC0.6A	1	
42	DB93-10519A	ASS'Y-PCB MAIN		1	
43	DB63-10033A	CSVER-CONTROL CASE	ABS, -, BLK, -, -	1	
44	DB96-40164B	ASS'Y-EVAP IN	APH450PG	-	
45	DB63-10430A	COVER-EVAP R	SGCCM, T0.8, -, -, L749 W 77	1	
46	DB96-10559A	ASS'Y-TUBE INLET PART	AP-1300, 1.2/850/900/950/1000	1	
47	DB96-50083A	ASS'Y COLLECTOR IN	AP-1604CR, -	1	
48	DB61-40052A	HOLDER-THERMISTOR	ABS, -, WHT, -	1	
49	DB91-20081A	ASS'Y ELEC HEATER	APH450PG	1	Heater only

6-2 Outdoor Unit

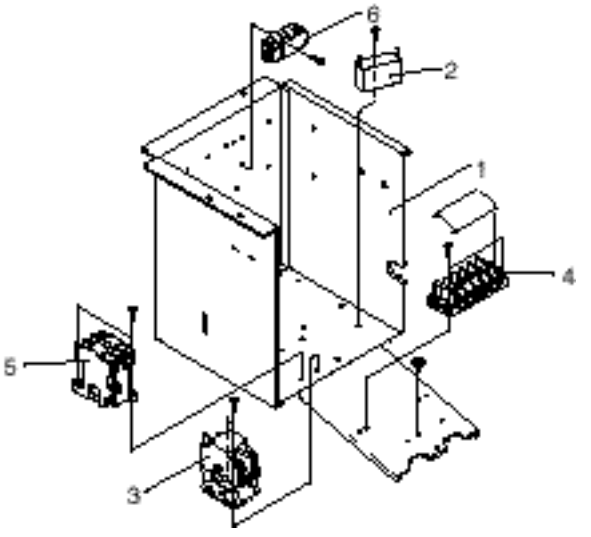
6-2-1 Outdoor Unit



■ PART LIST

No	CODE-NO	DESCRIPTION	SPECIFICATION	Q'TY	REMARKS
1	DB90-10565A	ASSY-CABI OUT AIR	WELD GUARD FAN	1	
2	DB63-30028C	GUARD-INLET	SC-91438T, -	1	
3	DB67-50067A	FAN-PROPELLER	AS+GF20, D495, 4BLADE	2	
4	DB95-20137F	ASSY-MOTOR OUT	AP-1100, OSM-6508SRC	1	
5	DB95-20137G	ASSY-MOTOR OUT	AP-1100, OSM-6508SRC WIRE	1	
6	DB90-30028E	ASSY-MOUNT MOTOR OUT	APE-1600CR, -	1	
7	DB61-40088A	HOLDER-FRAME	SGCC1, T1.6, -, -	1	
8	DB93-40693A	ASSY-CONTROL OUT	Heater only model	(1)	
	DB93-40696A	"	Non-heater model	(1)	
9	DB93-40272A	PARTITION	T1, -, 389.17°ø1239.46	1	
10	DB67-30025A	ASSY-BASE OUT	AP-3508, M8 WELD BOLT	1	
11	DB99-10114A	ASSY VALVE 3/8" CHECK	APH450PG	1	
12	DB99-10115A	ASSY-4 WAY V/V	APH450PG	1	
13	DB90-10071B	ASSY-CABI OUT LW SD	SECC-P(20/20), T0.8	1	
14	DB90-10085B	ASSY-CABI OUT UP SD	SECC-P(20/20), T0.8	1	
15	DB72-50556A	INSU SOUND	T12, W940, L380	1	
16	DB95-10068A	ASSY-COMP	CRNQ-0500-TFD	1	
17	DB73-10008A	GROMMET-MOUNT	BROWN	4	
18	DB90-10369D	ASSY-CABI OUT B	AP-1004/1604CR, -	1	
19	DB96-30277A	ASSY-COND UP	1.7 WAVE	1	
20	DB96-30278A	ASSY-COND LOW	1.7 WAVE	1	
21	DB98-20057A	ASSY-PLATE TOP	AP-1004/1604CR, -	1	
22	DB63-30110C	SCREEN-GUARD	P.E.H 100%, T2.5, -, -	1	
23	DB67-90017B	HANDLE	ABS, -, SC-90073R	1	

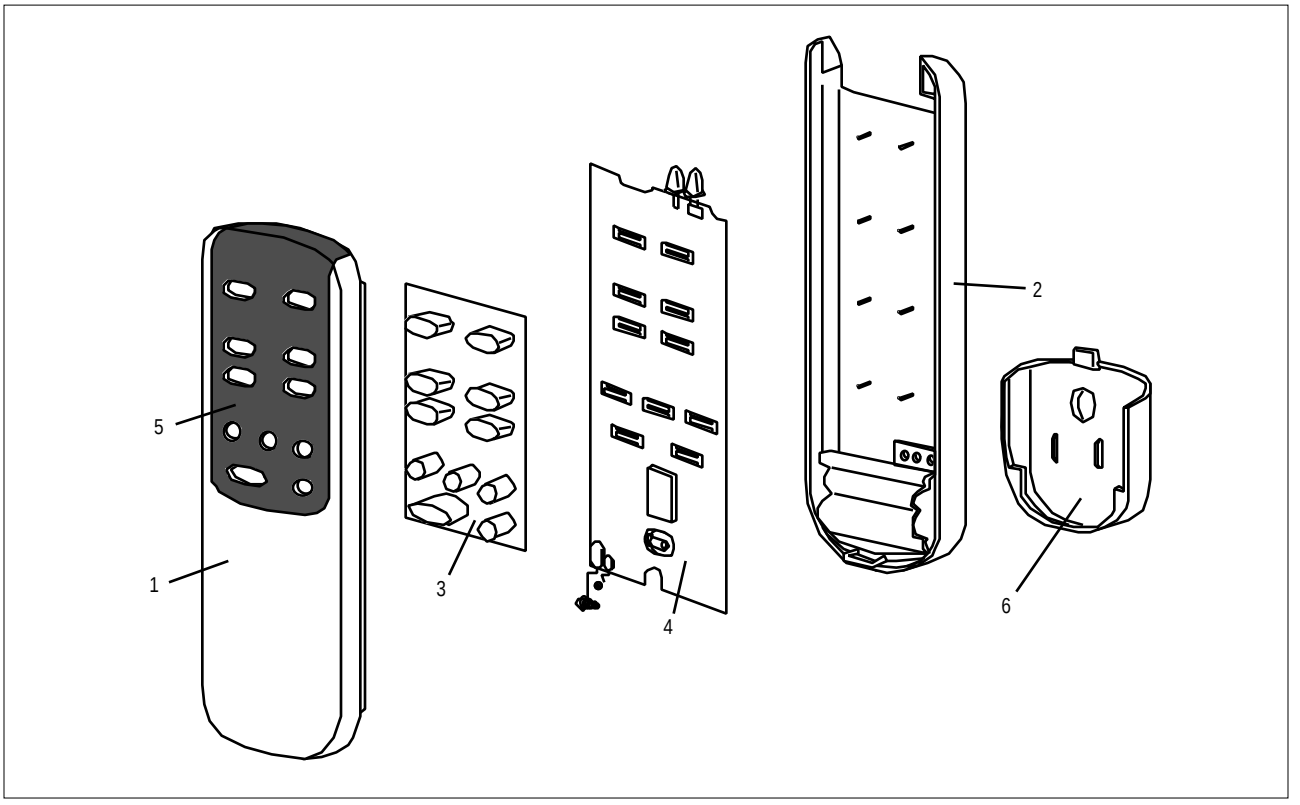
6-2-2 ASS'Y CONTROL BOX



■ Parts List

No	CODE NO	Description	Specification	Q'ty	Remark
1	DB93-40419A	ASS'Y CONTROL BOX OUT	SGCC-M, Z(Z=22)	1	
2	2501-001098	CAPACITOR OUT	450VAC 4uF	2	
3	DB34-90089A	MAGNET-CONTACTOR	42AF35AL	1	
4	DB65-40022A	TERMINAL BOARD	600V 35, 15A	1	
5	DB34-90090A	MAGNET-CONTACTOR	42AF35ALPM	1	Heater only
6	DB47-90121A	FILTER-NOISE	PC4-F05	1	

6-3 Remote Control



■ Parts List

No	CODE NO	Description	Specification	Q'ty	Remark
	DB93-30026K	ASS'Y-REMOCON	AR-H60	1	
1	DB61-10022A	CASE-REMOCON(UPP)	ABS	1	
2	DB61-10011A	CASE-REMOCON(LW)	ABS	1	
3	DB73-20013A	RUBBER(BT)	NBR	1	
4	DB93-10509A	ASS'Y-REMOCON PCB	APH450PG	1	
5	DB64-40008J	WINDOW-REMOCON	PC T1.5	1	
6	DB63-10081A	COVER BATTERY	ABS	1	

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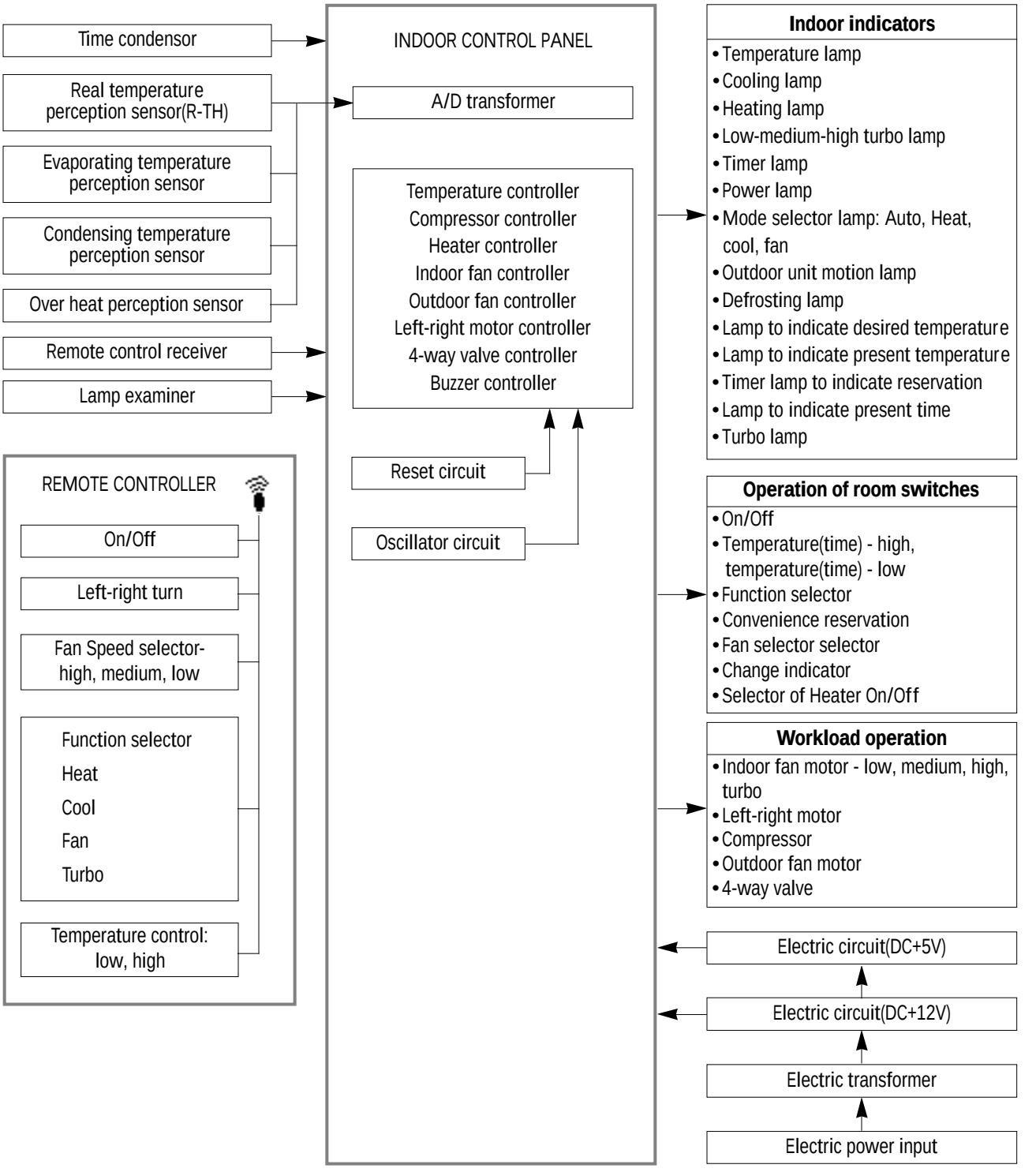
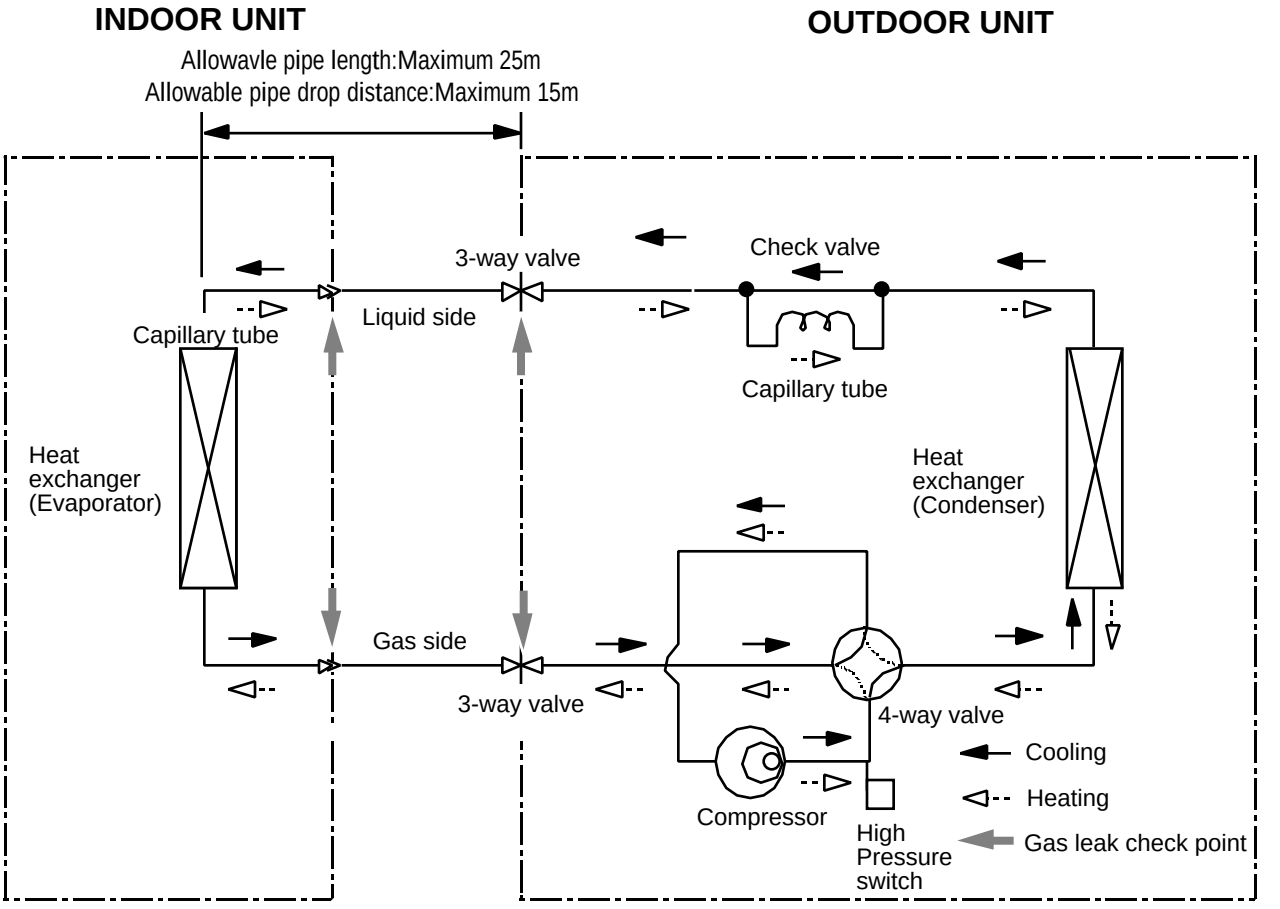
7. Block Diagrams

7-1 Micro Computer Block Diagram



7-2 Refrigerating Cycle Block Diagram



* Amount of refilling per extension length of 1m;
When extending the pipe length by more than 5m, 50g of R-22 refrigerant should be refilled per extension length of 1m.

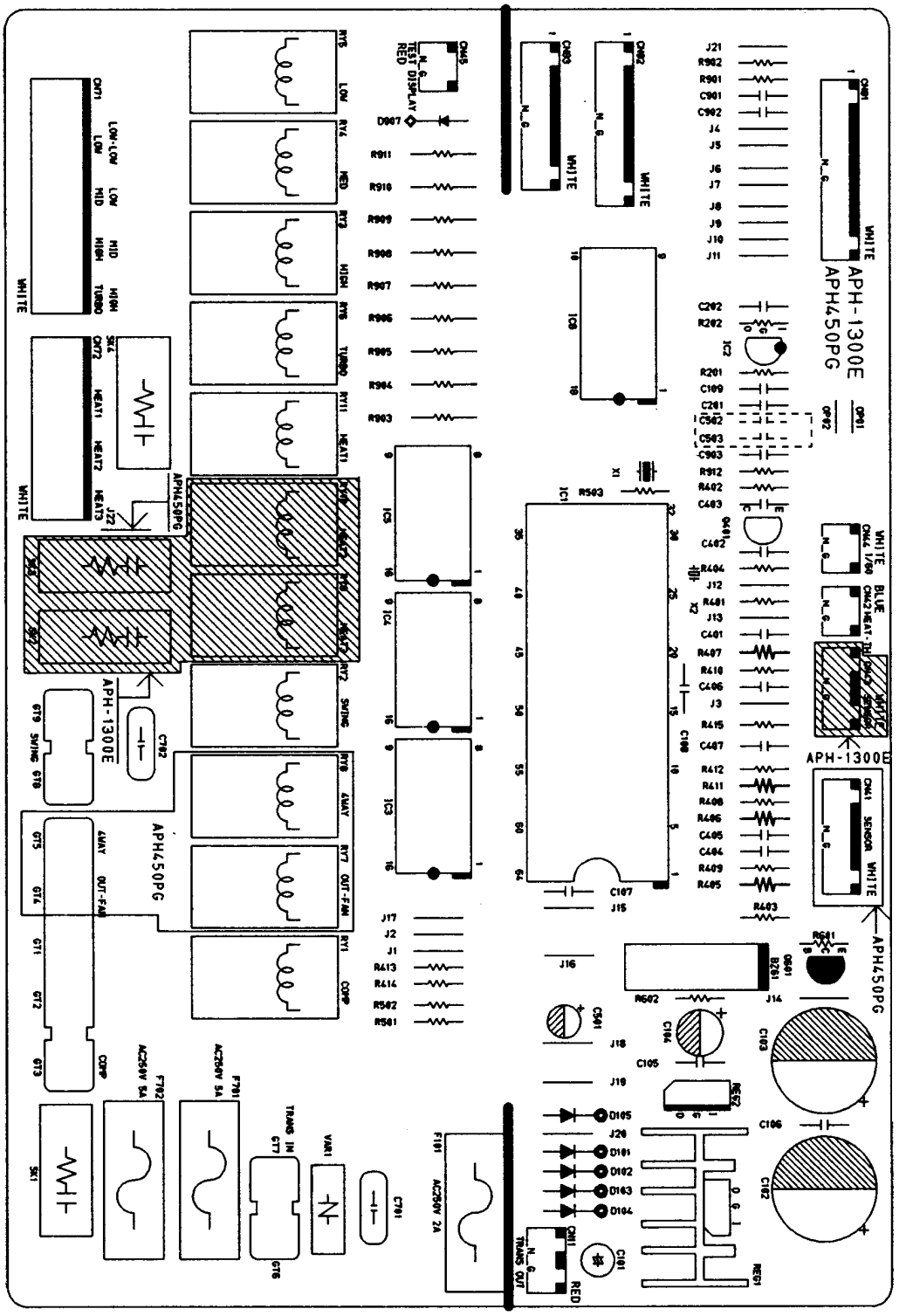
Refrigerating cycle temperature and pressure

Operating Condition		STD Pressure (kg/cm2G) (GAS SIDE)	Piping Temp.(˚C)		UseTemp. Condition (°C)			
			T1	T2	Indoor		Outdoor	
					DB	WB	DB	WB
Cooling	Standard	4.5~5.5	40~45	9~12	27	19	35	24
	Max over load	6.5~7.5	50~55	14~18	32	23	43	26
	Low temp	3~4	30~35	1~4	21	16	21	16
Heating	Standard	18.5~20.5	32~36	65~75	20	-	7	6
	Max over load	-	36~40	70~80	27	-	21	16
	Deice	-	28~32	40~45	20	-	2	1

MEMO

8. PCB Diagrams

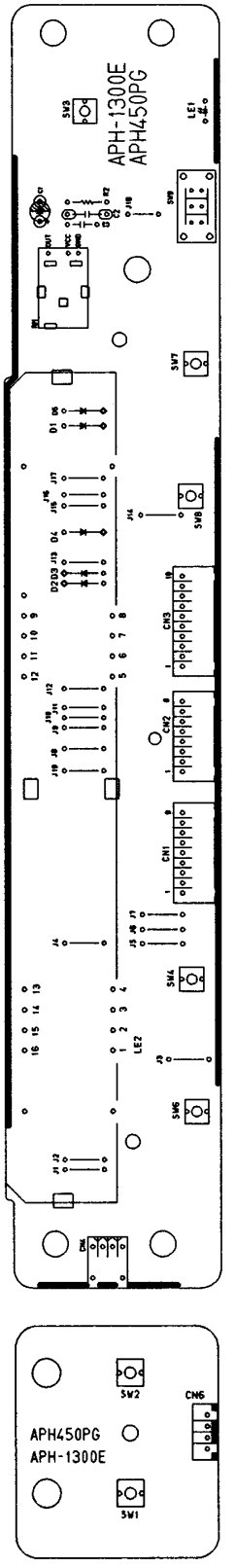
8-1 Ass'y Main PCB (Code No : DB93-10519A, B)



■ PARTS LIST

DESIGN LOCATION	CODE NO	Description	Specification	APH450PG	Remark
-	DE62-30031A	HEAT SINK(L)	AL6063 T16.8 W23.5 L30	1	
SK1, SK4	DE47-30019A	SPARK-KILLER	ESQ-1201	1	
F701, F702	3601-001094	FUSE	FST 250V 5A 20mm	2	
F101	DB47-90053A	FUSE	FST 250V 2.0A 20mm	1	
VAR1	DB47-90014A	VARISTOR	INR1-D471-SVC471D-10A	1	
RY1-RY8, RY11	3501-001042	RELAY	UT205-12S 250V3A	6	
C701	2306-000111	C-FILM	CF 912 M 630V T 104J	1	
C702	2301-000133	C-FILM	CF 912 M 630V T 103J	1	
CN11	3711-000880	CONNECTOR-WAFER	SMW250-03 RED	1	
CN41	3711-000940	CONNECTOR-WAFER	SMW250-06 BLUE	1	
CN44	3711-002662	CONNECTOR-WAFER	JSW250-02 WHT	1	
CN91	3711-000577	CONNECTOR-WAFER	SMW250-10 WHT	1	
CN92	3711-001084	CONNECTOR-WAFER	SMW250-08 WHT	1	
CN93	3711-001154	CONNECTOR-WAFER	SMW250-09 WAT	1	
CN71	3711-000357	CONNECTOR-WAFER	YW396-09A WHT	1	
	DB61-40240	FUSE HOLDER	FH-51H 7.5A	3	
IC1	DB09-10138A	IC-MCU (M1COM)	MB89635R-435	1	
IC2	DE13-20009A	IRESET IC	KA7533 DIP	1	
IC3, IC5	DE13-20017A	IC-LINEAR	KID65003AP	2	
IC4	1003-000217	IC-DRIVE	ULN2981	1	
Q601	0504-000201	TR-SWITCHING	R1002	2	
Q401	0501-000398	TR-GENERAL	KSC935Y	1	
REG1	DB47-90036A	C-VOLT REG	KA7812	1	
REG2	DB47-90037A	IC-VOLT REG	KA7805	1	
-		SCREW TAPPING	PH 3 L6 AB FEFZY	1	
D101-D105	DB47-90118A	DIODE-RECT	1N4007 1000V 1A	5	
D907	DB47-90011A	DIODE-SW	1N4148 1.2V 4.0NS T	1	
X1	2802-000103	RESONATOR	10MHz CST10MTW-TF	1	
X2	DE30-20013A	CRISTAL	32, 768KHE	1	
BZ61	DE30-20013A	BUZZER	CBE2220BA	1	
C102	2401-000725	C-ELECT	CE 04 C 35V T 222-M	1	
C103	2401-000710	C-ELECT	CE 04 C 25V T 222-M	1	
C104	2401-000303	C-ELECT	CE 04 C 25V 101-M	1	
C501	2401-003107	C-ELECT	CE 04 C 16V 470-M	1	
C105, C109, C201, C202 C401-C407	2201-000144	C-CERAMIC	CK 0A 50V T 104-Z	16	
C901, C902	2201-000176	C-CERAMIC	CK OA 50V T 103-Z	2	
C903	2401-000353	C-CERAMIC	CK OA 50V T 101-Z	1	
R201, R201	2001-000042	R-CARBON	RD 1/4 T 102-J	2	
R401, R403, R413-R415 R501, R502, R601, R901 R902	2001-000065	R-CARBON	RD 1/4 T 103-J	11	
R402	2001-000047	R-CARBON	RD 1/4 T 222-J	1	
R405, R406, R411	2004-001136	R-METAL	RD 1/4 T 682-F	2	
R404	2001-000588	R-CARBON	RD 1/4 T 332-J	1	
R408~R410, R912	2001-00036	R-CARBON	RD 1/4 T 330-J	4	
R602	2001-001172	R-CARBON	RD 1/2 T 620-J	1	
R903-R911	2003-000160	R-METAL OXIDE	RS 1T 121-J	9	
R407	2004-000616	R-METAL	RS 1/4 243-F	1	

8-2 Ass'y Panel PCB(Code No : DB93-10520A, B)



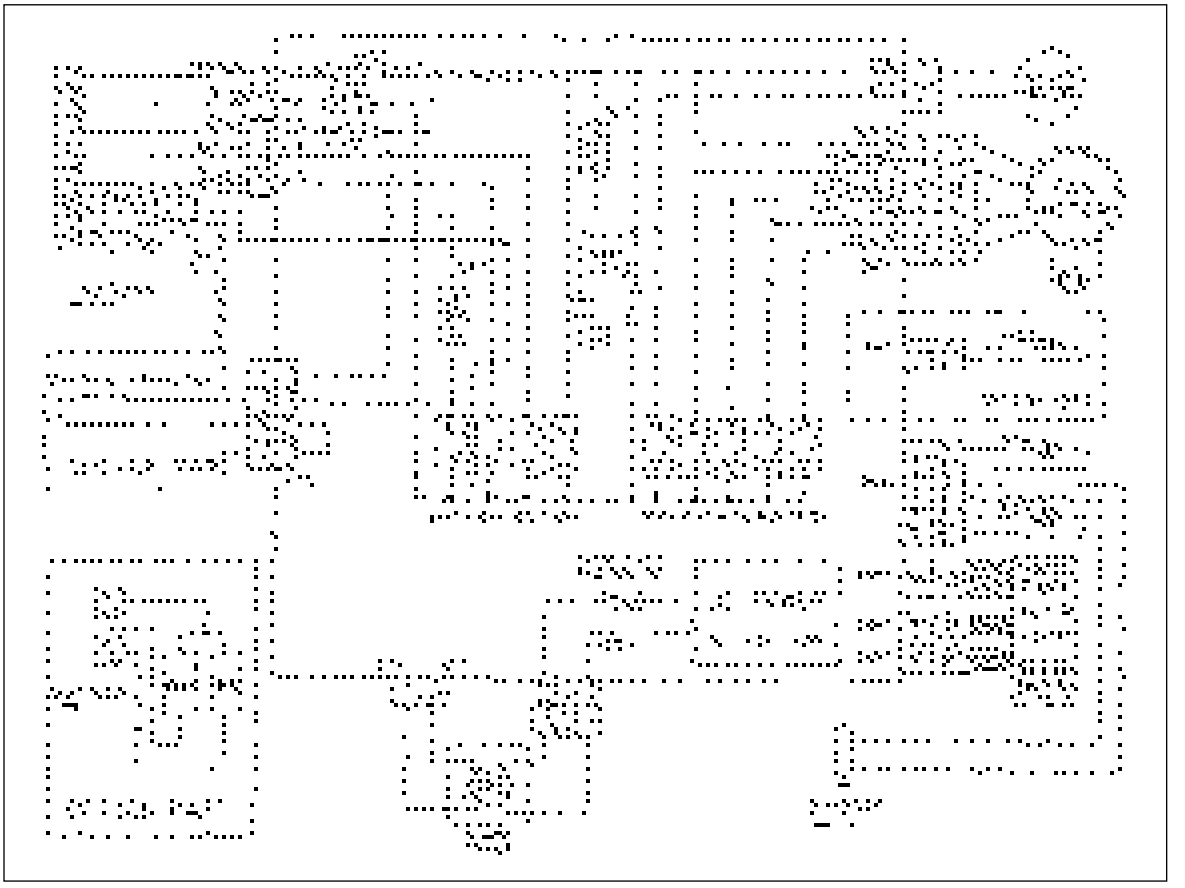
■ PART LIST

DESIGN LOCATION	CODE NO	Description	Specifition	Q'TY	Remark
R1	2001-000065	R-CARBON	RD 1/4 T 103-J	1	
C1	2401-003107	C-ELECT	CE 04 C 16V 470-M	1	
C2	2201-000144	C-CERAMIC	CK OA 50V T 104-Z	1	
-	DB32-50023A	MODULE REMOCON	TSOP-1238 TB1	1	
D1-05	DB47-90011A	DIODE SW	1N4148 1.2V	4	
LE1	DB07-10050A	LED LAMP	LTL-4212 RED T P10.0	1	
-	DE07-20142A	LED DISPIAY	SSG-9405T-01	1	
SW1-SW4, SW6-SW8	DB34-90082A	SW-TACT	KPT-1115D	7	
SW9	3408-000326	SW-SLIDE	-		
CN1	3711-000570	CONNECTOR-WAFER	SMAW250-10-WHT	1	
CN2	3711-001111	CONNECTOR-WAFER	SMAW250-08-WHT	1	
CN3	3711-001147	CONNECTOR-WAFER	SMAW250-09-WHT	1	
CN4	3710-000193	CONNECTOR-WAFER	BH250-04R WHT	1	
CN6	3711-000940	CONNECTOR-WAFER	YFAW205-304R WHT	1	

MEMO

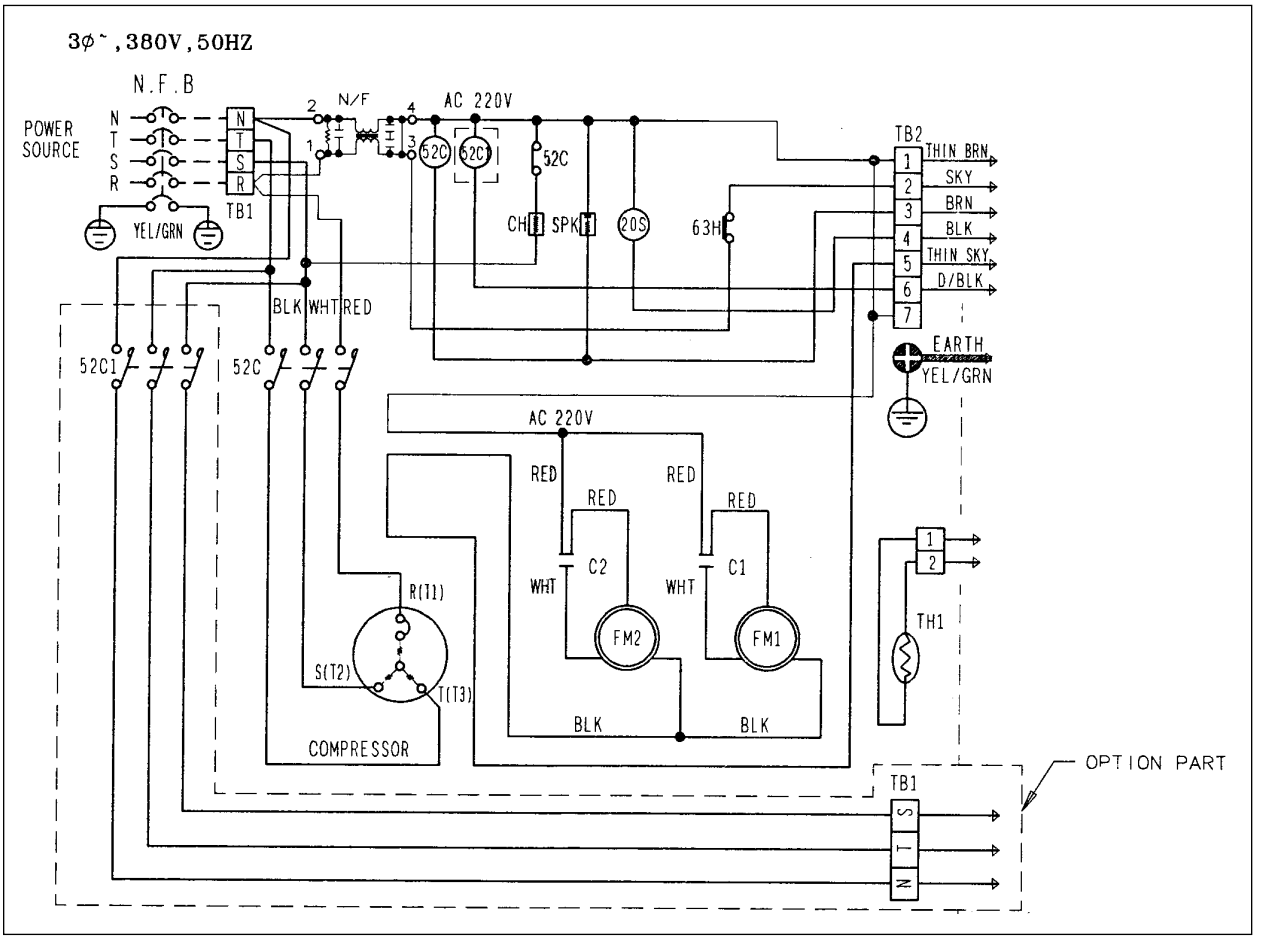
9. Wiring Diagrams

9-1 Indoor Unit



MARK	NAME
SK1,4	SPARK KILLER
VAR1	VARISTOR
FM	INDOOR FAN MOTOR
RTH ROOM	THERMISTOR
HTH	OVERHEAT SENSOR
ETH	EVAP. SENSOR
SWING	SWING MOTOR
RY1	COMPRESSOR DRIVE RELAY
RY2	SWING MOTOR DRIVE RELAY
RY3	FAN MOTOR DRIVE RELAY(HIGH)
RY4	FAN MOTOR DRIVE RELAY(MID)
RY5	FAN MOTOR DRIVE RELAY(LOW)
RY6	FAN MOTOR DRIVE RELAY(TURBO)
RY7	OUTDOOR FAN DRIVE RELAY
RY8	4WAY V/V DRIVE RELAY
RY11	HEATER DRIVE RELAY
HEATER	P.T.C. HEATER

9-2 Outdoor Unit



APH450PG	
NOTE	**NAME**
52C	MAGNETIC SWITCH COMP
52C1	MAGNETIC SWITCH ETH
TB 1, 2	TERMINAL BLOCK
TH 1	THERMISTOR CONDENSER
CH	CRANK CASE HEATER
SPK	SPARK KILLER
20S	4-WAY VALVE
C1,2	CAPACITOR OUT
N.F.B	CIRCUIT BREAKER 25A
63H	HIGH-PRESSURE SWITCH
FM1, 2	FAN MOTOR OUT
N/F	NOISE FILTER

* USE 25AMPS TIME DELAY FUSE OR CIRCUIT BREAKER

UPDA TE LOG SHEET

Application date	Page	Part#	Note(Cause & Solution)	S/Bulletin#

Use this page to keep any special servicing information. (Service Bulletin, etc.)
If only parts number changes, Just change parts number directly on parts list.
And if you need more information, please see the service bulletin

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First edition June 1995.

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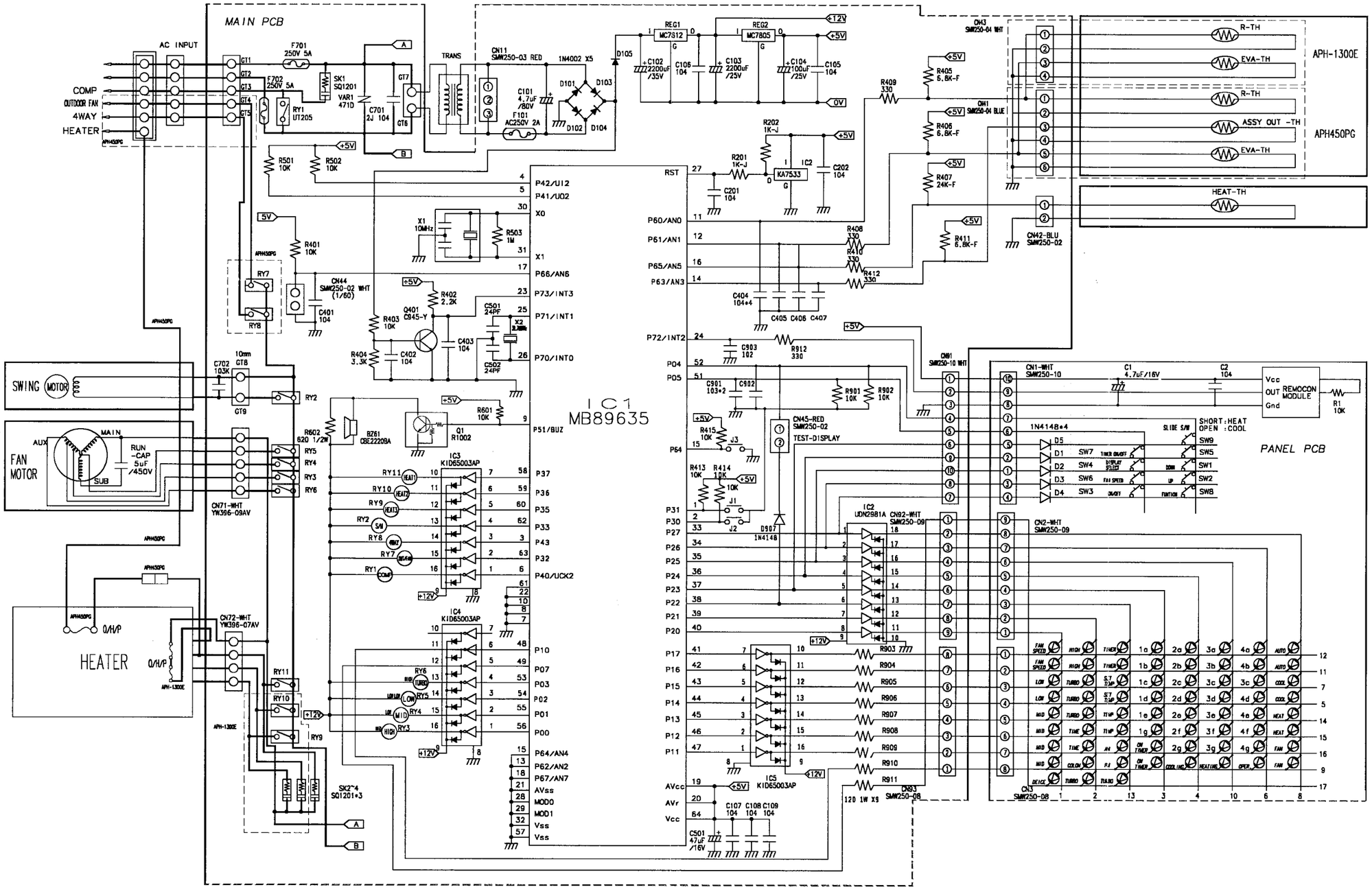
10. Schematic Diagrams

10-1 Indoor Unit